

FAA-STD-006
March 31, 1966

FEDERAL AVIATION AGENCY STANDARD

CONSTRUCTION OF CONCRETE SHAFT
AIR TRAFFIC CONTROL TOWER
FACILITY



TABLE OF CONTENTS(BY SECTIONS)DIVISION 1 - GENERAL REQUIREMENTS

Section A	General Conditions
Section B	Samples

DIVISION 2 - SITEWORK

Section A	Excavating, Filling, Backfilling and Grading
Section B	Footing Drains
Section C	Paving
Section D	Topsoiling, Seeding, Sodding and Planting

DIVISION 3 - CONCRETE

Section A	Concrete and Cement Work
-----------	--------------------------

DIVISION 4 - MASONRY

Section A	Masonry
Section B	Building Insulation

DIVISION 5 - METALS

Section A	Structural Steel
Section B	Roof Deck
Section C	Miscellaneous Metal
Section D	Window Wall

DIVISION 6 - CARPENTRY

Section A	Carpentry
-----------	-----------

DIVISION 7 - MOISTURE PROTECTION

Section A	Metallic Waterproofing
Section B	Caulking and Sealants
Section C	Roofing

DIVISION 8 - DOORS AND GLASS

Section A	Hollow Metal Work
Section B	Glass and Glazing

FAA-STD-006

DIVISION 9 - FINISHES

Section A	Furring, Lathing and Plastering
Section B	Ceramic Tile
Section C	Painting and Finishing
Section D	Wall Covering
Section E	Resilient Flooring
Section F	Sprayed Acoustical Treatment
Section G	Suspended Acoustical Ceiling

DIVISION 10 - SPECIALITIES

Section A	Metal Toilet Enclosures
Section B	Toilet Room Accessories
Section C	Builders Hardware
Section D	Exterior Partitions
Section E	Movable Office Partitions

DIVISION 11 - SPECIAL CONSTRUCTION

Section A	Erection of Control Cab
-----------	-------------------------

DIVISION 12 - CONVEYING SYSTEMS

Section A	Elevator
-----------	----------

DIVISION 13 - GENERAL REQUIREMENTS - MECHANICAL ELECTRICAL

Section A	Plumbing
Section B	Heating, Ventilating and Air Conditioning

DIVISION 14 - ELECTRICAL

* * *

TC-2

4

DIVISION 1SECTION AGENERAL CONDITIONS1A-01 FIELD OFFICE:

1A-01.1 On the site, or immediately adjacent to it, the Contractor shall provide a temporary office of approximately 300 sq. ft. (minimum), rectangular in shape and having a minimum nominal width of 10 feet, all on one floor for the sole use of the Government for the entire life of the contract. The building, including all interior fittings and furnishings shall remain the property of the Contractor and shall be renewed by him when directed by the Contracting Officer. The structure shall be weathertight and provided with ample heat, light, air conditioning, sanitary facilities, drinking water and a minimum of six convenience outlets. Doors and windows shall be secured with locks. Heating equipment shall maintain an inside temperature of 70°F and cooling equipment an inside temperature of 80°F at the local outdoor design temperatures.

1A-01.2 The Contractor shall supply interior furnishings including a minimum of two (2) 2'-10" x 5'-0" desks with locks on drawers, six (6) chairs, two (2) legal size 4-drawer filing cabinets with locks, one (1) legal size 2-drawer filing cabinet with locks, one (1) plan rack with sticks to hold minimum of ten sets of plans, one (1) 3'-6" x 8'-0" drawing board, one (1) 3'-6" x 8'-0" reference table, sample shelves, drinking facilities and two (2) wastepaper baskets. Phone service and other office equipment and supplies will be furnished by the Government.

1A-01.3 All janitor service, sanitation facilities, electricity, heat and air conditioning with associated service connections shall be furnished and maintained by the Contractor during the entire life of the contract or until the removal of all facilities is requested by the Contracting Officer. The office shall be kept clean and neat and the windows washed periodically by the Contractor.

1A-02 ACCIDENT AND FIRE PROTECTION: The Contractor shall comply with the requirements as outlined in the Safety in Construction and Alteration Work Handbook, AD P 3900.1, as issued by the Federal Aviation Agency.

1A-03 AS-BUILT DRAWINGS, MAINTENANCE MANUAL, UTILITIES SURVEY

1A-03.1 During the progress of the work, the Contractor shall keep on file two complete and separate sets of blackline prints on which shall be accurately and promptly noted, as the work progresses, any changes, revisions or additions to the general construction work, mechanical work or electrical

FAA-STD-006

work. At the completion of the work, the Contractor shall submit two sets of the "as-built" drawings to the Contracting Officer.

1A-03.2 The Contractor shall prepare a maintenance manual which shall consist of a complete set of manufacturers' catalogs, instructions and other similar data, including the necessary photographic cuts, diagrams, valve charts and the like covering all mechanical and manually operated devices furnished and/or installed in the building. This manual is intended to serve to instruct and assist the maintenance men in the care, operation, maintenance and repair of all such devices. Bound copies of the above, in triplicate, shall be submitted to the Contracting Officer.

1A-03.3 Upon completion of the contract, the Contractor shall furnish to the Contracting Officer an accurately dimensioned survey, showing the location and elevation of all utility lines (water, gas, electric, sewer, steam, etc.) including valves, connections and changes in direction, installed under the contract within the contract limits and outside the building walls. The point where utility lines emerge from the building shall be located from the building corners. The points where the utility lines leave the property shall be located from lot monuments. The survey shall be made to scale, as approved by the Contracting Officer, and drawn with waterproof ink on tracing cloth, or by other method approved by the Contracting Officer, which will provide a permanent reproducible record.

1A-04 SHOP DRAWINGS

1A-04.1 The Contractor shall submit for the approval of the Contracting Officer shop drawings, fabrication drawings, erection and setting drawings, schedule drawings, manufacturers' scale drawings, wiring and control diagrams, cuts or entire catalogs, pamphlets, descriptive literature, and performance and test data.

1A-04.2 Submit 6 copies of all drawings, 5 of which shall be black line or blue line prints and the 6th copy being a reproducible print, made by a process approved by the Contracting Officer. Submit catalog, cuts, descriptive literature and the like in 6 copies. Only one copy of each item involved will be available to be returned to the Contractor, unless the Contractor elects to submit more than 6 copies. Upon final approval, the Contractor shall furnish copies of the approved shop drawings to all affected trades.

1A-04.3 Drawings and schedules shall be checked and coordinated with the work of any other trade involved before they are submitted for approval, and shall bear the Contractor's stamp of approval as evidence of such checking and coordination.

1A-04.4 Drawings shall be complete, assembled in sets and shall bear:

Date
Number of Drawing or revision
Name of Project or Facility
Name of Contractor and Subcontractor
Clear identity of Contents and
Location on work

1A-04.5 The Contractor shall allow 30 calendar days for Government review of any one submission.

1A-04.6 The Contractor shall submit within 30 days after date of Notice to Proceed, for the Contracting Officer's approval, a "Shop Drawing Schedule" showing the dates on which shop drawings, fabrication drawings, erection and setting drawings, equipment lists, test data and similar items are to be submitted by the Contractor for the principal items of work, taking into consideration the time required by the Government for the coordination, review and return of such drawings.

1A-05 SAMPLES

1A-05.1 After award of Contract, the Contractor shall furnish, for the approval of the Government, samples required by other sections of the specifications or requested by the Contracting Officer.

1A-06 TEMPORARY TOILETS: The Contractor shall provide adequate temporary toilet accommodations, including water supply, for all persons employed on the work, and located where approved by the Contracting Officer. The accommodations shall be proper enclosures and shall be maintained in proper, safe and sanitary conditions in accordance with local codes and be suitably heated when required.

1A-07 TEMPORARY WATER SUPPLY

1A-07.1 The Contractor shall make his own arrangements for the use of water during construction. Cost of use of water shall be paid by the Contractor.

1A-07.2 From the source of supply the Contractor shall arrange for all temporary connections, including piping, fittings and valves. The Contractor shall provide all necessary hose, water barrels and similar equipment as required for use by the various trades.

1A-08 TEMPORARY LIGHT AND POWER

1A-08.1 The Contractor shall arrange for, provide and maintain all temporary electric light and power as required throughout the work. He shall pay all costs for the installation and use of such temporary light and power.

FAA-STD-006

1A-08.2 The Contractor shall provide all supply lines for light and power, extension outlets, extension cords, trailers, receptacles, bulbs, fuses and other equipment required for safety and for proper execution of the work, and for inspection purposes.

1A-09 TEMPORARY HEAT

1A-09.1 The Contractor shall provide sufficient temporary heat as follows:

1A-09.1.1 As necessary to protect all work, materials and equipment against injury from dampness and cold.

1A-09.1.2 At all times during the placing, setting and curing of concrete, to insure the heating of the spaces involved to not less than 55 degrees Fahrenheit.

1A-09.1.3 From the beginning of the application of expanded polystyrene insulation and/or plaster and during the setting and curing period, to produce a temperature in the spaces involved of not less than 55 degrees Fahrenheit.

1A-09.1.4 For a period of 10 days previous to the placing of interior finishes and until the completion of the building, to produce a temperature of not less than 70 degrees Fahrenheit.

1A-09.2 The Contractor may use smokeless unit heaters (Underwriters', Factory Mutual and Fire Marshal approved) of type approved by the Contracting Officer until the structure is enclosed. The use of kerosene, fuel oil or coke burning salamanders is prohibited.

1A-09.2.1 After the structure is enclosed, provide a complete system of temporary radiation, approved by the Contracting Officer, to protect the enclosed structure from freezing and to expedite the construction work of all trades.

1A-09.2.2 The Contractor may use, with written permission of the Contracting Officer, the permanent heating system as necessary for the proper execution, protection and drying out of the work and shall maintain all apparatus in a condition acceptable to the Contracting Officer.

1A-09.3 All costs in connection with heating, including equipment, installation, operation, attendance, fuel, electricity, etc., shall be paid for by the Contractor.

1A-10 CLEANING AND PROTECTION

1A-10.1 The Contractor shall require each subcontractor engaged upon the

Page(s) 1A-5 of this document was (were)
missing upon receipt. The document has been reordered
and will be refilmed when received.

INFORMATION HANDLING SERVICES

IHS #A0236b (11/81)

FAA-STD-006

1A-11.2 No materials, rubbish or debris will be permitted to drop free, but shall be removed by the use of the material hoist, rubbish chute or other method approved by the Contracting Officer.

1A-11.3 Hoists and chutes shall be erected as to prevent damage, staining or marring of any permanent work.

1A-12 CONSTRUCTION SIGN

1A-12.1 The Contractor shall furnish and erect a construction sign in accordance with the drawings. The sign shall be erected at commencement of work and located where directed by the Contracting Officer. The Contractor shall maintain the sign in good condition throughout the construction period.

1A-13 PROTECTION OF WORK AND PROPERTY

1A-13.1 The Contractor shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance, whether or not the same has been covered by partial payments made by the Government and whether or not damage to his work was caused by the Contractor or by any subcontractor or by others than the employees of the Government in the course of their employment.

1A-13.2 The Contractor shall have the overall responsibility for the performance and enforcement of all forms of protection against weather and he shall be responsible for repairs and replacements of new or existing material or equipment damaged as a result of inadequate protection. The Contractor shall re-seed and completely restore to original condition grass areas damaged by his operation and shall promptly repair any damage to parking surfaces, walks, curbs, roads, aprons, etc., caused by his or his subcontractors operations.

1A-13.3 Materials and surfaces shown to remain exposed in the final construction which are damaged in the course of contract work shall be repaired or replaced to the satisfaction of the Contracting Officer and at no expense to the Government.

* * *

1A-6

10

FAA-STD-006

DIVISION 1SECTION BSAMPLES

1B-01 SCOPE: This Section covers the requirement for furnishing samples, certificates of compliance, test reports and related items to the Contracting Officer for testing, selection and approval.

1B-02 APPROVAL

1B-02.1 All samples, certificates and test reports shall be submitted prepaid and in ample time for proper action by the Government before materials, which samples, certificates and reports represent, are delivered at the work. The minimum time necessary for Government approval of samples is 30 calendar days after receipt of sample.

1B-02.2 Properly label each sample with name and quality of the material, manufacturer's name and brand, name of project, Contractor's name and date of submission.

1B-02.3 All materials installed in the work shall match the approved samples. After a sample submitted by the Contractor has been approved no substitution will be permitted without written approval by the Contracting Officer.

1B-03 SAMPLES, CERTIFICATES AND TEST REPORTS

1B-03.1 Unless otherwise directed by the Government Representative, the Contractor shall submit samples, in duplicate, in sufficient size and/or quantity as required to perform the tests called for in the Specification. Each sample shall be accompanied by the manufacturer's certificate of compliance or certified test reports, in triplicate.

1B-03.2 Samples submitted for selection of color, texture and finish shall show the extremes in range, if any, of the colors, textures and finishes of the items to be furnished.

1B-03.3 Where samples, certificate of compliance and test reports are called for in the various Sections of the Specifications, they shall be submitted upon request by the Government Representative. Samples, Certificates of Compliance and Test Reports are required for the following:

Section 2A - Excavation, Filling, Backfilling and Grading

Porous fill

Reinforced paper and/or polyethylene plastic sheets;
fiberglass blanket

FAA-STD-006

Section 2B - Footing Drains

Drain tile or concrete pipe

Section 2C - Paving

Aggregates, each type

Section 2D - Topsoil, Seeding Sodding and Planting

Topsoil

Humus

Fertilizers

Grass Seed

Sod

Insecticides

Section 3A - Concrete and Cement Work

Cement, each type

Air entrainment

Aggregates, each type

Reinforcing steel, wire and mesh and
reinforcing bar accessoriesForm ties, form bolts, inserts,
flashing reglets, anchor slots

Form materials, each type

Premolded fillers, water stops,
vapor barriers and slip sheets

Bonding agent

Finishing materials: form oil,
abrasive aggregate, form sealer,
sealer (floor hardener) retardant
form coating, water repellent,
color pigment

Applied cement finish

Colored cement finish

Sealant

Section 4A - Masonry

Cement, each type

Lime

Sand

Concrete block

Glazed block

Face brick

Joint reinforcement

Control joints

Dovetail anchors, anchor slots, anchors,
ties and accessories

Joint Filler

FAA-STD-006

Section 4B - Building Insulation

Thermal insulation, each type
Cement
Sand
Latex mortar additive
Certification

Section 5A - Structural Steel

None Required

Section 5B - Roof Decking

Decking
Weld washers
Hole covers

Section 5C - Miscellaneous Metal

Steel
Aluminum, various alloys, including finishes
to be furnished
Sheet steel
Abrasive Safety Nosings
Shop paint, various types, to be furnished
Section of railings, each type, including
closed end, brackets and bracket supports
Saddles, each type
Anchor slots, each type
Louver details
Coping
Metal wall panel

Section 5D - Window Walls

Metal: steel and aluminum, including
finishes to be furnished
Glass
Tapes, sealants, caulking stops and fillers

Section 6A - Carpentry

Lumber and plywood for cabinets

Section 7A - Metallic Waterproofing

Cement
Sand
Metallic waterproofing compound

FAA-STD-006

Section 7B - Caulking and Sealing

2-part Polyurethane sealants
1-part sealants
Joint primer
Joint fillers
Certification
Color samples

Section 7C - Roofing

None Required

Section 8A - Hollow Metal Work

Sheet steel, including finishes
Corner section of door and frame
Weatherstripping

Section 8B - Glass and Glazing

Glass, each type
Tapes and sealants

Section 9A - Furring, Lathing and Plastering

Plaster, each type, including samples showing
each type of finish
Bond adhesive
Lath, each type
Accessories, i.e., grounds, casing beads
and corner beads
Resilient furring and clips
Hangers and inserts
Furring channels and angles, each
size and type
Wire accessories

Section 9B - Ceramic Tile

Floor tile and base
Primers, sealers, underlayment and
grout; thin-set adhesives
Dry-set mortar
Certificate of Grade

Section 9C - Painting and Finishing

Sample of each type or finish to be used
Color samples
Painting schedule

Section 9D - Wall Covering

Sample of wall covering
Primers, sealers and adhesives

Section 9E - Resilient Flooring

Each type of resilient flooring
Adhesive, primer and underlayment
Certification

Section 9F - Sprayed-On Acoustical Treatment

Sample showing texture and color
Certification of Noise Reduction
Coefficient

Section 9G - Suspended Acoustical Ceiling

Tile
Suspension members

Section 10A - Metal Toilet Enclosures

Color samples of finishes
Samples of hardware and accessories

Section 10B - Toilet Room Accessories

Catalog cuts for each item to be furnished
Samples of finishes

Section 10C - Builders Hardware

Samples of each type specified
Hardware scheduled

Section 10D - Exterior Metal Partition

Panel finish
Aluminum members
Fasteners

FAA-STD-006

Section 10E - Movable Office Partitions

3 x 6 inch metal plates each kind and finish
Corner section of door, frame and trim

Section 11A - Erection of Control Cab

None Required

Section 12A - Elevator

Samples of all finishes for hoistway
entrances, including frames, doors,
panels and saddles
Samples of all floor, wall, ceiling and
door finishes for elevator cab
Samples of carpet for cab floor

Section 13A - Plumbing

None Required

Section 14A - Heating Ventilating and Air Conditioning

None Required

Section 15A - Electrical

None Required

* * *

1B-6

16

DIVISION 2SECTION AEXCAVATION, FILLING, BACKFILLING AND GRADING

2A-01 SCOPE: This Section covers the requirement for performing all operations in connection with the Excavation, Filling, Backfilling, Rough and Finish Grading within the project property lines, areas to be paved and seeded outside the property lines and elsewhere on the airport as indicated on the drawings or mentioned in the specifications.

2A-02 PROTECTION: All banks, slopes, and adjacent areas, not specifically excavated or graded, shall be fully protected against damage.

2A-03 SOILS DATA: Bowing logs are found in the contract documents.

2A-04 EXCAVATION

2A-04.1 General: All material now in place, natural or artificial, including rock, boulders, existing structures and foundations, rubbish and debris, shall be removed as necessary for performance of all work under the contract. Excavation will be unclassified and the Contractor shall include in his job price the cost of removing all of the materials encountered. The results of soil borings taken within the property limits and soil probings taken along the routes of the proposed utility lines are found in the contract documents. However, the bidder is required to examine the location of the work and determine for himself the nature of the conditions including sub soil conditions effecting the cost of the work. On request to the Contracting Officer, he may obtain permission to make his own soil borings or probings in order to determine the nature of the sub soil materials to be excavated. All excavations shall be kept free of water, regardless of the elevation at which ground or flood water may be encountered. Sufficient working space shall be provided to permit the placing, inspection, and completion of all work under the contract. Excavated material, unsuitable or not required for filling, backfilling, or grading, shall be removed from the site. The disposal of this material shall be the responsibility of the Contractor. All materials, natural or artificial, whose removal is deemed necessary for the performance of the contract, shall be removed to a depth of 2 feet below the finished grades, unless indicated on the drawing to remain.

2A-04.2 Pits and Trenches: Footing pits and trenches may be excavated to permit forming of concrete, or may be excavated to exact size of the concrete. If footing trenches are excavated to the exact size of the concrete, the sides must be maintained to withstand sloughing during the placing of concrete. Undercutting will not be permitted. If excavations by the contractor's own volition are carried below the required levels, they shall be backfilled with concrete of the class specified for footings, or the foundation shall be laid at the excavated level as directed and at no additional

FAA-STD-006

cost to the Government. All footings shall bear on undisturbed soil unless the foundation material is rock. Where rock occurs and footings are indicated to rest on same, the rock shall be levelled to a clean, even, hard surface. Sloping rock for bearings shall be stepped and treated in the same manner. No footing shall be permitted to rest partly on soil and partly on rock. In the event excavation reveals potential foundation bearing surfaces of part rock and part soil, the Contractor shall be directed to remove the soil and fill the voids with concrete as specified above to the elevations required. The contract shall be adjusted for this additional work in accordance with Clause 3, "Changes" of the General Provisions to the contract.

2A-04.3 Inspection of Excavated Surfaces: When excavations for footings have reached the required elevations, the excavated surfaces shall be inspected and approved by the Government's Representative before proceeding with further construction. The Government's Representative may direct the Contractor to make soil borings in order to determine the suitability of the foundation material. If the material disclosed is satisfactory to the Government's Representative the boring holes shall be filled with concrete of the class specified for the footings. The contract shall be adjusted for the cost of soil borings and concrete fill (if required). If the material disclosed is unsatisfactory, thus requiring further study of the foundation material, additional excavation and concrete fill, revisions to the footings, etc., the Government shall determine the nature and magnitude of the additional work to be performed by the contractor and the contract adjusted in accordance with Clauses 3 and 4 of the General Provisions to the contract.

2A-04.4 Temporary Support and Capping: Any utility lines, piping, conduits, etc., encountered, that are not to be removed, shall be temporarily supported and maintained until permanent support has been restored. Utility lines, piping, conduits, etc., to be removed, shall be cut off and capped in accordance with the regulation of the city or utility company involved, and at the Contractor's expense. Existing utility lines to remain and utility lines constructed during excavation and backfilling, if damaged, shall be repaired at the Contractor's expense.

2A-04.5 Freezing: When freezing weather is expected, excavations shall not be made to the full depth, unless footing can be placed immediately. If excavation is already at full depth the excavation shall be protected from frost.

2A-04.6 Water proofed Surfaces: Excavations adjacent to surfaces where metallic waterproofing occurs shall be kept dry until completion of the waterproofing treatments. Fill and backfill shall not be placed against such surfaces until the waterproofing treatments have been completed, inspected and accepted by the Government's Representative.

2A-04.7 Pipes and Duct Trenches: Excavation for water pipe, sanitary sewer pipes, storm drainage pipes, concrete ductbanks and manholes shall be carried out to lines and grades shown on the drawings or mentioned in these specifications. All excavations shall be kept free of water at all times regardless of its origin. Any water accumulation in trenches or other excavations shall be removed by pumping or by other approved methods. Excavated material suitable for backfilling shall be piled in an orderly manner, a sufficient distance from the banks of the excavation to avoid overloading and to prevent slides or cave-ins. All excavated material not required or unsuitable for backfill shall be removed from the airport. Sheet piling and shoring shall be provided along taxiways and runways and where required to withstand sloughing or cave-in of walls and for the protection of the work, existing utilities and structures. The bottom of trenches and other excavations shall be accurately graded to provide uniform bearing and/or continuous support on undisturbed soil for all appurtenances and equipment to be installed and for each section of pipe. Unauthorized overdepths shall be backfilled with loose, granular, moist earth, thoroughly compacted. Whenever wet or otherwise unstable soil that is incapable of properly supporting the item to be installed is encountered, as determined by the Contracting Officer, it shall be removed to the depth required and backfilled with suitable material to the proper grade. In excavating for water and sewer lines, the width of the trench at and below the top of the pipe shall be such that the clear space between the barrel of the pipe and the trench wall shall not exceed 8 inches on either side of the pipe. The bottom of the trench shall be manually dug after the trench bottom has been graded and, in order that the pipe rest upon the prepared bottom for as nearly its full length as practicable, shall be only of such length, depth, and width as required for properly making the joint.

2A-05 GROUNDWATER: The Contractor shall control groundwater during excavation, foundation construction and filling operations. Special care must be taken to avoid damage to foundation materials by groundwater which would reduce their load bearing capacity and thereby necessitate a change in footing design and construction. The Contractor shall prepare and submit to the Contracting Officer for approval, the method(s) he plans to use for controlling groundwater during construction operations.

2A-06 FILL AND BACKFILLING

2A-06.1 General: Prior to commencing fill and backfilling operations, excavated and fill areas shall be cleared entirely of concrete form work, debris, etc. Fill and backfill shall be clean earth, free from perishable material, placed in evenly distributed layers of thickness specified herein over the entire areas; properly moistened and thoroughly consolidated by power operated mechanical equipment to prevent subsequent settlement. Material from other sources shall be supplied for fill and backfill when sufficient or suitable material is not available on the site. All fill and backfill shall be well graded coarse granular material free of all organic, frozen, expanding or shrinking material. Fill for seeded or sodded areas, shall be brought to within 6 inches of the finished grades. In event excavated material is not suitable or insufficient amounts for use

FAA-STD-006

as fill and backfill, the contractor shall provide from off site sources, fill and backfill conforming to the above requirements and subject to the approval of the Government Representative.

2A-06.2 Rocks, Stones and Boulders: Rocks, stones and boulders up to 2 cubic feet in size may be incorporated in fill areas (except within 10 feet of any structure) except that earth only containing stones not over 2" shall be used for the top 12" of fill. Rocks, stones and boulders shall be well distributed to eliminate any voids that may cause undue settlement or prevent proper consolidation of the filled areas.

2A-06.3 Drainage: Coarse fill, over footing drains, back of retaining walls, under approach work, and under concrete slabs, shall be clean, hard gravel, broken stone, or slag, unless otherwise indicated on the drawings, and shall comply with Federal Specification SS-A-281b, Class 2, Grade A sized from #4 to two inches. All drainage fill shall be protected against the infiltration of concrete by a layer of reinforced paper UU-P-264a or pure polyethylene plastic sheets, .004 inches thick, and against the infiltration of soil by a 1/2" thick, non-organic flexible 1-lb. density fiberglass blanket similar to Pittsburgh Plate Glass Co.'s "Topsoil Separator Heavy" or approved equal.

2A-06.4 Old Excavations: Any old wells, cisterns, catch basins, existing cavities or voids, and the like that are encountered in proximity to the footings or which come within the assumed pyramid of pressure, shall be cleaned out and filled with 2,000 p.s.i. concrete. Any other old excavations, within the limits of the work under the contract shall be cleaned out and filled with bank-run gravel that passes a 3 inch mesh and well tamped into place, up to existing grade, or within 2 feet of finished grade in seeded areas. The balance of the fill in seeded areas shall be earth.

2A-06.5 Soil Condition: Cohesive soils that have become hard or lumpy, or that have been piled and have become dry, shall be broken up and reconditioned for moisture content immediately before use in filling or backfilling.

2A-06.6 Compaction of Fill and Backfill: Compact each layer of fill and backfill to the specified percent of maximum density obtained at optimum moisture content in accordance with ASTM D-1557, Method D, as follows:

2A-4

- (a) Fill under concrete floor slabs: 6 inch layers compacted to 95%. Prior to installing fill under floor slabs, the original soil shall be removed to provide a minimum of 12 inches of fill under the slabs. The surface of the remaining original soil shall be compacted to 95% maximum density at optimum moisture content before the fill material is placed and compacted. The last layer of fill shall be built up to an elevation slightly above the finish grades before compaction. The compacted fill surfaces shall be carefully checked for the correct elevations and profiles.
- (b) Fill under unpaved areas: 12 inch layers compacted to 90%.
- (c) Fill under pavements and sidewalks: 12 inch layers compacted to 95%.
- (d) Backfill: 8 inch layers compacted to 95% except that the excavated region adjacent to the tower shaft which provides the bearing surface for the passage way foundations shall be backfilled using 6" layers and compacted to 95%. The backfilling and compaction of this region shall be under the full time supervision of the Contractor and full time observation of the Government Representative. Prior to commencing backfilling operations, all temporary wooden sheets, piling, planking, timbers, etc., are to be removed. Any caving of excavations, or any backfill placed before inspection is completed, shall be removed, by the Contractor at his expense.

2A-06.7 Compaction Tests: The Contractor shall make a compaction test for each specified percentage requirement without cost to the Government. When test results are not satisfied subsequent tests on recompacted areas shall be performed by the Contractor.

2A-06.8 Compaction Equipment: Compaction equipment shall be subject to the approval of the Government Representative. Heavy equipment for spreading and compacting fill and backfill shall not be operated closer to walls than a distance equal to the depth of the wall below the current top of the fill. Power operated mechanical hand dampers or vibrators shall be used between this point and the wall.

2A-07 STRIPPING TOPSOIL: Existing topsoil meeting the requirements of Section TOPSOILING, SEEDING, AND SODDING shall be stripped to a minimum depth of 6", within the contract limits. Topsoil shall be deposited in storage piles, separate from other excavated materials, free from roots, stones and other deleterious material.

FAA-STD-006

2A-08 GRADING

2A-08.1 General: All grading shall be done to bring the ground to the finished grade. Grade not otherwise shown, shall be uniformly level or sloped between points where elevations are given, or between such points and existing grades, shaped to drain away from building walls.

2A-08.2 Trees: Trees and shrubs, that are removed, shall have their roots removed to a depth of 18 inches below the finished grade.

2A-08.3 Placing: Material shall be placed in evenly distributed layers over the entire area; each layer 12" or less in depth before compaction, spread and compacted as specified. Filling for areas to be seeded, sodded, or receive planting shall be graded to within 6" of finished grade.

2A-08.4 Existing Areas within contract limits to be seeded, sodded or receive planting, but not requiring cut or fill shall be cut to 6 inches below finish grade and leveled for topsoiling.

2A-09 REMOVAL OF TEST PANEL: After completion and acceptance of the concrete for the tower, and when directed by the Contracting Officer, the Contractor shall remove the concrete test panel, including footings, and restore area occupied by the test panel.

* * *

2A-6

DIVISION 2SECTION BFOOTING DRAINS

2B-01 SCOPE: This Section covers the requirement for footing drains and their installation.

2B-02 GENERAL: For location and extent of footing drains see drawings and applicable details.

2B-03 MATERIALS

2B-03.1 Materials shall meet requirements of referenced Federal Specifications, American Society For Testing Material Standards and requirements specified herein.

2B-03.2 Clay Drain Tile: SS-T-310, standard strength; requirements on absorption and saturation coefficient will be waived.

2B-03.3 Perforated Concrete Pipe: ASTM C-4444, standard strength, non-reinforced.

2B-03.4 Porous Concrete Pipe: AASHTO M-17660: interlocking tongue and groove joint.

2B-03.5 Wrappings for joints of clay drain tile shall be 18 x 14, .01 inch diameter mesh copper wire cloth strips 3" wide, with both ends locked to a 3/4" strip of 16 ounce copper.

2B-04 LAYING

2B-04.1 Footing drains shall be laid to true grades and alignment, with a continuous fall in the direction of flow.

2B-04.2 Perforated and porous concrete pipe shall be laid with closed joints. Clay drain tile shall be laid with 1/2" open joints, and the joints wrapped with copper wire cloth.

2B-04.3 Size of pipe as indicated on drawings. Lay on Concrete Drain bed, not less than 3" in depth, firmly compacted. Each section of pipe shall rest upon the bed through the entire length, with recesses formed where required to accommodate bell joints.

2B-04.4 Any pipe which has had its grade or joint disturbed after laying shall be removed and relaid. Interior of all pipe shall be clean before being laid. Drain lines shall be tested with water before being covered. Re-

FAA-STD-006

move any obstructions and repeat test until system is satisfactory.

2B-04.5 Filling of the porous fill over the pipe shall be carefully done in layers so as not to displace the pipe, and all earth and debris shall be kept out of such fill. Stone or gravel shall not be dumped directly onto pipe but shall be carefully placed in a manner which will prevent damage to the pipe. Note: the porous fill is specified in Section, "Excavation, Filling, Backfilling and Grading."

2B-04.6 Footing drains shall be connected to drainage outlets as indicated on drawings.

* * *

2B-2

24

FAA-STD-006

DIVISION 2SECTION CPAVING

2C-01 SCOPE: This Section covers the requirement for paving and its construction.

2C-02 GENERAL: For location and extent of work see drawings.

2C-03 DESCRIPTION: The paving consists of a 4" Select-Material base course, a 1½" binder course and a 1½" wearing course.

2C-04 SELECT-MATERIAL BASE COURSE

2C-04.1 Materials: 4" compacted thickness of select base-course material consisting of broken stone, disintegrated granite, rock quarry waste or screenings, or combinations of these and sand, all free from vegetable matter, clay lumps or balls of clay. Oversize material shall be removed by screens or by hand picking. All material used in the select-material base course shall meet the applicable gradation given in Table I and be obtained from approved sources.

2C-04.2 Sampling and Testing: All sampling and testing shall be by the Contractor at his expense. Sampling shall be done under the supervision of the Contracting Officer. All tests to determine the requirements specified herein shall be performed under the supervision of the Contracting Officer. The source of the select-material shall be selected in advance of the time when the select-material will be required in the work, and suitably sized samples shall be submitted to the Contracting Officer not less than 30 days before commencing the work. Additional samples of select-material shall be furnished during construction as required by the Contracting Officer. Field testing, to determine the density requirements for the base course as specified shall be performed by the Contractor without cost to the Government. Unless otherwise directed by the Contracting Officer, ASTM Serial Designation D 75-59 shall be used for sampling materials.

2C-04.3 Gradation of Aggregates: The stone or screenings shall conform to the grading shown in Table I and shall be well graded within the limits shown. Either stone or screenings may be used.

FAA-STD-006

TABLE I

Percentage by weight passing
square mesh sieves

<u>STONE BASE COURSE</u>		<u>SCREENINGS BASE COURSE</u>	
<u>Sieve Size</u>	<u>% Passing</u>	<u>Size</u>	<u>% Passing</u>
2-1/2"	100	1-1/2"	100
1/2	40-75	1/2"	50-95
#8	20-50	#8	20-55
#35	8-29	#35	6-28
#200	2-10	#200	2-10
.02 mm	0-3	.02 mm	0-3

2C-04.4 Stockpiling Materials: Select-material shall be stockpiled only at the locations as designated by the Contracting Officer. The piles shall be shaped as directed by the Contracting Officer. Prior to stockpiling the material, the storage sites shall be cleared and leveled by the Contractor. The method of stockpiling shall be such as to prevent segregation.

2C-04.5 Weather Limitations: Select-material base courses shall be constructed only when the weather conditions do not detrimentally affect the the quality of the finished course. Any areas of the base course that are damaged by the effects of freezing temperatures or other weather conditions, during any phase of the construction, shall be reshaped and recompacted by the Contractor to conform with the requirements of the specification, without additional cost to the Government.

2C-04.6 Preparation of Subgrade: Prior to constructing the select-material base course herein specified, the previously constructed subgrade shall be cleaned of all foreign substances. The surface of the subgrade will be inspected by the Contracting Officer for adequate compaction and surface tolerances within the limits as specified. Any ruts or soft-yielding spots that may appear in the subgrade, any areas having inadequate compaction, and any deviations of the surface from the requirements specified shall be corrected by loosening, removing and adding approved material, reshaping, and recompacting the affected areas to line and grade, and to the specified density requirements.

2C-04.7 Placing of Materials: The select-material from approved sources shall be deposited and spread uniformly on the prepared subgrade in a layer of such depth that when compacted, the layer will have a uniform thickness of 4". Portions of the layer in which the aggregates become segregated in spreading shall be removed and be replaced with satisfactory material, or shall be remixed as directed by the Contracting Officer.

2C-2

2C-04.8 Spreading and Compacting: Immediately following the placing and mixing, the select-material shall be spread evenly to a uniform layer. The loose thickness of the layer shall be such that the compaction requirements as specified below may be obtained with the rolling equipment used, and the finished thickness of the layer conform to the thickness specified. The layer shall be rolled with a power roller. Rolling shall continue until the layer or layers are compacted through the full depth to at least 100 per cent of the density at optimum moisture, based on the weight per cubic foot of the material as determined by American Association of State Highway Officials Method T-99.

2C-04.8.1 Additional water in such amounts as are necessary to obtain the density required shall be applied to the select-material during the compaction operations. The surface of the layer shall be finished by blading and rolling with power rollers. In all places not accessible to the rolling equipment, the select-material shall be compacted with approved tamping equipment. Blading, rolling and tamping shall continue until the surface is smooth and free from waves and irregularities. If at any time the select-material is excessively moistened by rain, it shall be aerated by means of suitable equipment, until the moisture content of the select-material is satisfactory to the Contracting Officer, and the surface then recompacted and finished as specified above.

2C-05 PREPARATION OF SELECT-MATERIAL BASE COURSE: Prior to constructing the binder course, the previously constructed select-material base course shall be cleaned of all foreign substances. The surface of the select-material base course will be inspected by the Contracting Officer for adequate compaction and surface tolerances. The underlying base course for the binder course shall conform to the requirements specified for "SELECT-MATERIAL BASE COURSE". Any ruts or soft-yielding spots that may appear in the select-material base course, any areas having inadequate compaction, and any deviations of the surface of more than 3/8" in 10' from the true profile and cross section, shall be corrected by loosening, removing and adding approved material, reshaping, and recompacting the affected area to line and grade, and to the specified density requirements.

2C-06 PRIME COAT

2C-06.1 The prime coat shall be placed only on a slightly moist, clean base course free from loose or foreign material when atmospheric temperature is above 50° F. From 0.2 to 0.6 gal. per sq. yd. (depending on surface texture) of medium-curing cut-back asphalt (MC-1) shall be applied with a pressure distributor at a temperature between 100° and 175° F., or rapid-curing cut-back asphalt (RC-2) at a temperature between 125° and 200° F.

2C-06.2 MC shall conform to A.S.T.M. D-598.

FAA-STD-006

2C-06.3 RC shall conform to A.S.T.M. D-597.

2C-06.4 Traffic shall be kept off for at least 48 hours or longer if required to allow prime to set.

2C-07 BINDER COURSE: The binder course shall consist of a uniformly graded coarse aggregate and sand, thoroughly mixed with asphalt cement, and shall be laid upon the primed base course to a finished thickness of $1\frac{1}{2}$ ".

2C-07.1 Materials: Coarse Aggregate shall consist of crushed stone of reasonably uniform quality throughout, clean and free from an excess of dust and from flat or elongated pieces.

2C-07.1.1 All coarse aggregates shall have a percentage of wear by the Los Angeles abrasion machine test of not more than 50 for base or binder courses and 40 for surface courses, as per A.S.T.M. Test C-131. The aggregates shall be of such nature that a thorough coating of the bituminous material will not strip off upon contact with water.

2C-07.1.2 Fine Aggregates shall consist of clean, tough, rough-surfaced grains, free from clay, loam, and other foreign matter. As delivered to the mixer it shall be free from clayey lumps or loosely bonded aggregations, and the individual particles shall be free from adhering dust. All shall pass a No. 4 sieve and not more than 5% a No. 200 sieve.

2C-07.1.3 Asphalt Cement (AC): Asphalt cement shall conform to A.A.S.H.O. M-20 or M-22, and shall fall within the following limits:

Penetration @ 77°F, 100g, 5 seconds	85-100
-------------------------------------	--------

2C-07.1.4 Mixture shall conform to the following:

TABLE II

PERCENTAGE BY WEIGHT PASSING SIEVES (SQUARE OPENINGS)

<u>Sieve Size</u>	<u>Per Cent Passing</u>
$1\frac{1}{2}$ in.	100
1 in.	78-100
$\frac{1}{2}$ in.	53-70
No. 4	30-48
No. 10	20-37
No. 40	10-21
No. 80	6-15
No. 200	3-8
Bitumen %	4-6.5

2C-4

20-07.1.5 The exact amount of bitumen shall be determined by sample mixes which must show grains completely coated. Samples shall not bleed when compacted. No change will be made in contract price due to variations in quantity of bitumen.

Tolerances For
Approved Mix

Aggregate passing sieve No. 4 or larger	5%
Aggregate passing sieve No. 10, 40 and 80	4%
Aggregate passing sieve No. 200	2%
Bitumen	0.5%

Temperature of mixing 25° F.

20-07.2 Mixing: Mixing shall be done in a suitable plug mill or continuous mixer. Minimum time of mixing shall be 30 sec., and mixing shall be sufficient to coat all particles. The temperature of the materials when mixed shall be as follows:

Aggregates	150° to 325° F. and never more than 25° F. above temperature of bituminous material
------------	---

Asphalt	225° to 340° F.
---------	-----------------

20-07.3 Transporting: Transporting shall be done in trucks having insulated, tight, clean, oiled bodies. Each truck load shall be tarpaulin covered.

20-07.4 Placing: Placing shall be done only when surface is dry and atmospheric temperature is above 40° F. Placing shall not start until prime coat has set.

20-07.4.1 The contact surfaces of all structures shall be painted with hot bituminous material as used in the mixture.

20-07.4.2 The mixture shall be spread by mechanical spreaders; only in inaccessible locations shall the mixture be spread by hand. Hand placing shall be from a steel dump board by means of hot shovels. Hand spreading shall be with hot rakes of suitable design. The temperature of the mixture when spread shall be between 225° and 300° F.

20-07.5 Compacting: The mixture, as soon after it is spread as it will bear the roller without undue displacement or hair cracking, shall be rolled with a 3-wheel roller weighing not less than 10 tons. Roller wheels shall be equipped with scraping and sprinkling devices and shall be kept properly moistened without excess of oil or water. Rolling shall start longitudinally at the sides and proceed toward the center. Each trip of the roller shall overlap the previous trip by at least 1 ft. Alternate trips of the roller shall be of slightly different lengths. The speed of the roller shall not exceed 3 miles per hour.

20-

FAA-STD-006

2C-07.5.1 Where no curb exists the roller wheel shall overlap the shoulder a sufficient number of times to compact the shoulder firmly against the pavement. Then rolling shall be done diagonally in two directions with a tandem roller weighing not less than 8 tons, the second diagonal rolling crossing the lines of the first. If pavement width permits, rolling shall also be at right angles to the center line. Rolling shall be continued until all creases have been removed and 92% to 95% density attained. Mechanical tampers shall be used for compacting in locations inaccessible to the roller.

2C-07.6 Joints: When new mixture is placed against previously placed mixture, the joint shall be cut back to a clean vertical surface and painted with hot bituminous material as used in the mixture.

2C-07.7 Tolerances: The surface shall be true to the established grade. The thickness shall not vary more than $\frac{1}{4}$ " from that shown on the plan. The finished surface shall not vary more than $\frac{1}{4}$ " in 10' from the true profile and cross section.

2C-08 TACK COAT: The tack coat shall be applied to the binder course before laying the wearing course. It shall be placed like the prime coat using from 0.08 to 0.12 gal. per sq. yd. of RC-2, 3 or 4 at a temperature between 50° and 120° F.

2C-09 WEARING COURSE - FINE MIX: The wearing course shall consist of the same materials plus mineral filler and shall be mixed, placed and compacted the same as the binder course, except as follows:

2C-09.1 Mineral Filler: Shall consist of thoroughly dry stone dust, Portland cement, or other artificially or naturally powdered mineral dust, 65% to 100% of which will pass a No. 200 mesh sieve.

2C-09.2 Fine Aggregate: Ninety-eight to 100% shall pass a No. 10 sieve and not more than 5% a No. 200 sieve.

2C-09.3 Mixture: Mixture of aggregates, mineral filler, and bitumen shall conform to the following:

COARSE MIX
PERCENTAGE BY WEIGHT PASSING SIEVES (SQUARE OPENINGS)

<u>Sieve Size</u>	<u>Per Cent Passing</u>
$\frac{1}{2}$ in.	100
$\frac{3}{8}$ in.	84-100
No. 4	60-73
No. 10	43-57
No. 40	23-33
No. 80	13-20
No. 200	4-8
Bitumen %	5-7.5

The exact amount of bitumen shall be determined as specified for the binder course.

20-09.4 Joints: Joints shall be at least 1' from joints in the binder course and shall present the same texture, density, and smoothness as the rest of the pavement.

20-09.5 Compacting: Compacted density after rolling shall be 93% to 96%. The outside edges of the pavement shall be trimmed neatly to line while the course is being finished.

20-09.6 Tolerances: The finished surface shall not vary more than 1/8" in 10' from the true profile and cross section. Such tests will be performed by the Contractor in the presence of the Resident Engineer. Any deviation in excess of this amount shall be corrected as directed by the Resident Engineer.

20-09.7 Appearance: The finished surface shall be uniform in texture and appearance.

20-09.8 Protection of Pavements: After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until it has cooled and hardened and in no case in less than 6 hours.

20-10 APPROVAL OF MATERIALS: Materials may be used if accompanied by manufacturer's certificate of compliance pending any tests which may be made by the Engineer. The manufacturer's certificates shall include certificate of compliance covering quality and grading of aggregates and quality and grades of bituminous materials.

20-11 TESTS: The contractor shall cut one sample of paving which shall be tested for density at the Contractors expense. Each load of bitumen or mixture shall be tested for temperature of application.

20-12 EQUIPMENT: All equipment, tools, and machines used in the performance of the work required by this section shall be subject to the approval of the Contracting Officer, and shall be maintained in satisfactory working condition at all times.

20-12.1 Material Spreading Equipment: The equipment for spreading aggregate shall be adjustable, and capable of spreading material at controlled amounts per square yard.

20-12.2 Sprinkling Equipment: Sprinkling equipment shall be pressure distributors or other approved equipment, designed to apply water uniformly and at controlled quantities to variable widths of surface.

FAA-STD-006

2C-13 GRADE CONTROL: The lines and grade shall be established by the Contractor under the supervision of the Contracting Officer, and shall be maintained by the Contractor.

2C-14 MAINTENANCE: The finished paving shall be maintained by the Contractor in a condition satisfactory to the Contracting Officer until the contract is completed.

* * *

2C-8

DIVISION 2SECTION DTOPSOILING, SEEDING, SODDING AND PLANTING

2D-01 SCOPE: This Section covers the requirement for performing all operations in connection with the Topsoiling, Seeding, Sodding and Planting and related work within the contract limits.

2D-02 GENERAL: For locations and extent of work see Drawings. The work consists of, but is not limited to the following:

2D-02.1 Preparation of the subgrade after it has been graded as specified under another Section of the Specification.

2D-02.2 Furnishing, placing and spreading topsoil.

2D-02.3 Furnishing and incorporating, organic matter, fertilizer, lime, insecticides and similar materials in the topsoil.

2D-02.4 Grading, rolling, raking and seeding of areas indicated on drawings to be seeded.

2D-02.5 Furnishing and installing sod on slopes and on other areas where noted on drawings.

2D-02.6 Excavating and backfill as required for Plant Materials and the immediate disposal from the Site of all excavated subsoil.

2D-02.7 Submitting samples and analyses for approval in accordance with the requirements of the Specification.

2D-02.8 Furnishing, tagging, planting, staking, fertilizing, spraying and mulching all plant materials.

2D-02.9 Protection, maintenance, guarantee and replacement of seeded and sodded areas and plants.

2D-02.10 Protection and maintenance of existing trees.

2D-02.11 Clean-up.

2D-02.12 All other labor and materials necessary or required to satisfactorily complete the work.

2D-03 WORK SPECIFIED UNDER OTHER SECTIONS

2D-03.1 Grading of subgrade to a point 6" below finished grades for seeded and sodded areas.

2D-1

33

FAA-STD-006

2D-03.2 Construction of pavements, gravel walks and sidewalks.

2D-04 STANDARDS

2D-04.1 Analyses and tests of materials such as, but not limited to, topsoil, fertilizers, insecticides and other materials of similar character required to be made under these Specifications shall be made in accordance with the current method of the Association of Official Agricultural Chemists.

2D-04.2 Plant names used in Plant List, as noted on Drawings, conform to "Standardized Plant Names", published by the American Joint Committee on Horticultural Nomenclature (Current Edition).

2D-04.3 The size and quality standards of nursery stock shall conform to those of the American Association of Nurserymen, unless otherwise specified.

2D-05 SAMPLES, ANALYSES AND TESTS

2D-05.1 Samples and certified analyses of a recognized laboratory shall be submitted by the Contractor at his own expense for approval by the Contracting Officer for topsoil, humus, fertilizers, grass seed, sod, insecticides and materials of similar character before delivery to the Site. Manufacturer's certified analysis for Standard Products will be acceptable in lieu of laboratory tests subject to the approval of the Contracting Officer.

2D-05.2 Submit samples in approved containers, in proper amounts, appropriately labeled.

2D-05.3 Samples of grass seed before mixing shall be submitted in one pound bags. The cost of the tests and analyses of each sample shall be borne by the Contractor.

2D-05.4 Approval of samples shall not be construed as final acceptance. The Government reserves the right to take samples of the materials delivered to the Site and have them analysed for comparison with the Specification requirements. If the tests show non-compliance with the Specifications, the cost of such tests shall be borne by the Contractor. Material delivered which does not comply with the Specifications shall be rejected and shall be removed from the site by the Contractor.

2D-06 INSPECTION

2D-06.1 The Contractor shall be responsible for furnishing all certificates of inspection of plant materials as required by Federal, State or other Authorities to accompany each shipment of plants and on arrival, the certificates shall be filed with the Government Representative.

2D-06.2 Prior to inspection of plant materials by the Government Represen-

2D-2

34

tative, the Contractor shall select and tag with identification numbers all trees, specimen plants, and three or more samples typical of each kind and size of all other plant materials proposed for use.

2D-06.3 All plants shall be subject to inspection by the Government Representative. Plants required for the work may be inspected and tagged at the place of growth before being dug. Inspection and tagging at the place of growth shall not affect the Government's right to reject such plants on or after delivery thereof to the site.

2D-06.4 Inspection of plants at the place of growth or upon delivery will be for quality and size; variety, color and all other requirements being the responsibility of the Contractor. Inspection for size of ball of roots, latent defects and for other requirements will be made at the Site during progress of the work.

2D-06.5 Tagged samples of plant materials shall be delivered to the Site and planted in locations approved by the Government Representative. These tagged samples shall be maintained, protected and used as standards for comparison with the plants furnished for the work.

2D-06.6 The Contractor shall make a formal request in advance for any inspections at the various nurseries and collecting grounds. This request shall state the location of the nursery or collecting grounds and shall list the particular plants which are to be inspected as well as the size of such plants.

2D-06.7 If the plants and materials which are required to be inspected are more than 100 miles from the site, the cost of the inspection, travel and maintenance of the Government's Inspector shall be borne by the Contractor.

2D-06.8 Inspection of topsoil, humus and manure will be made prior to time of delivery to the Site. The Government may require field, storage pile or pit examination and take samples for analysis.

2D-06.9 Inspection of soils and plant materials shall be made between June 15 and September 15 and between December 15 and March 15, unless otherwise directed by the Contracting Officer.

2D-07 WATER: The Contractor shall arrange for and pay for all water required for the execution of the work.

2D-08 TOPSOIL

2D-08.1 Topsoil shall consist of natural loam, of uniform quality, free from subsoil, hard clods, stiff clay, hard pan, sods, partially disintegrated debris, or any other undesirable material, and shall contain at least 2 percent organic matter determined by loss on ignition of moisture-free samples

FAA-STD-006

dried in accordance with current methods of Association of Official Agricultural Chemists. Acidity range shall be pH 5.0 to pH 7.0 inclusive.

2D-08.1.1 MECHANICAL ANALYSIS

<u>Passing</u>	<u>Retained on</u>	<u>Percentage</u>
1-inch screen		100 percent
1-inch screen	1/2-inch screen	not more than
	(gravel) No.	3 percent
1/2-inch screen	100U.S.S. mesh	
	sieve(sand)	40 percent -
		60 percent
No. 100 U.S.S.	(very fine sand,	40 percent -
mesh sieve	silt and clay)	60 percent

All percentages are to be based on dry weight of sample.

2D-08.1.2 CHEMICAL ANALYSIS

Electrical conductivity	under 50
Nitrate nitrogen:	40
Ammonia nitrogen:	25
Phosphorus:	160
Potassium:	250
Calcium:	4000

2D-08.2 Contractor shall furnish a certified report of an approved analytical chemist showing the analyses of representative samples of topsoil proposed for use. Topsoil shall not be delivered to the site until approval of samples by the Contracting Officer, but such approval shall not constitute final acceptance. The Government reserves the right to reject on or after delivery any material which does not meet these specifications, or in which more than sixty percent of the material passing a No. 100 U.S.S. mesh sieve consists of clay as determined by the buoyous hydrometer or by the decantation method.

2D-08.3 Topsoil stripped from the site may be used if meeting the requirements specified. Submit analysis. If the existing topsoil is deficient in plant food, it may be enriched in accordance with the recommendations of the local county agricultural agent or the local County Agricultural Extension Director or the Regional Land Grant College, subject to the approval of the Contracting Officer.

2D-08.4 When grading of site is completed, all surface areas designated on contract drawings to receive sodding or seeding, with the exception of surface areas occupied by exposed structures or paved areas shall be topsoiled and left ready for seeding or sodding.

2D-4

36.

2D-08.5 Seeded and sodded areas shall be surfaced with topsoil at least 6" thick after compacting. Existing grades shall be modified, as necessary to fulfill this requirement, even if existing grades coincide with the finished grades.

2D-08.6 After filling, grading and other contract operations have been completed, to the point where these areas will not be disturbed by any subsequent work, the subgrades shall be cleaned free from waste materials of all kinds, then scarified and pulverized to a depth of 4", graded to remove surface inequalities and then covered with topsoil to the depth specified.

2D-08.7 The topsoil shall be spread uniformly and then compacted by a roller, weighing 85 to 100 pounds per foot of width, to the required lines and levels and the minimum thickness specified. The subgrade and topsoil shall be damp and free from frost when the work is performed and none of the work shall be done under dusty, muddy, or freezing conditions.

2D-08.8 If the topsoil is sandy add peat, 4 bales (6 cu. ft./bale) per 1000 square feet of area. If the topsoil is heavy clay add 5 cu. yds. of coarse sand or 750 pounds of calcined clay per 1000 square feet of area. Regardless of which material is used, thoroughly mix with the upper 6" of soil, using a roto-tiller, disc harrow or other approved mechanical means.

2D-08.9 Fumigate soil with menthyl bromide or other approved soil fumigants before planting to control objectionable grasses, weeds, certain diseases causing soil organisms, nematodes, and certain soil insects. Use soil fumigants according to the manufacturer's directions. Do not use these fumigants under and around trees or other valuable plants.

2D-09 MATERIALS

2D-09.1 Manure: Well rotted cow, horse or sheep manure free from sawdust, shavings or refuse of any kind, and shall not contain more than 25 percent of straw by volume.

2D-09.2 Lime: Ground Dolomitic limestone containing not less than 85 percent of calcium and magnesium carbonates, ground so that 100 percent will pass a No. 10 screen and not less than 50 percent will pass a No. 100 screen. Labels on packages shall show content and screen analysis.

2D-09.3 Fertilizer: A complete fertilizer meeting the requirements of

FAA-STD-006

Federal Specification O-F-241a, with percentages of nitrogen, phosphoric acid and potash as herein specified. Fertilizer shall be furnished in bags or other standard containers, with name, weight and guaranteed analysis of contents clearly marked thereon.

2D-09.3.1 Combined N-P-K content shall be not less than 20 percent of the total, and the N content shall be not less than 5 percent of the total, by weight.

2D-09.4 Bone Meal: Finely ground having a minimum analysis of 2 percent nitrogen and 20 percent phosphoric acid.

2D-09.5 Peat: A natural residue formed by the decomposition of reeds, sedges or mosses from fresh water site, free from lumps, roots and stones, conforming to Federal Specification Q-P-166c. Moss peat shall be of horticultural grade (fine shreds).

2D-09.6 Sand: Clean, coarse, ungraded sand conforming to requirements of ASTM C-33.

2D-09.7 Mulch: Well rotted sawdust, minimum 2 years old, shredded pine bark or tan bark.

2D-09.8 Tree Paint: R.I.W. Tree Surgery Paint, Toch Bros., New York, N.Y.; Sherwin Williams Pruning Compound, or approved equal.

2D-10 MATERIALS FOR GUYING AND WRAPPING

2D-10.1 Stakes: Sound No. 2 Douglas fir of uniform dimension, or white cedar posts sizes as indicated on drawings. Stakes of Douglas fir shall receive 1 coat primer and 2 coats of exterior type oil paint, color black green (almost black).

2D-10.2 Wire: Guy wires for fastening trees to stakes: gauge, pliable galvanized iron.

2D-10.3 Hose: For encasing guy wires; 2-ply reinforced rubber garden hose, not less than $\frac{1}{2}$ " diameter; new or used.

2D-10.4 Turnbuckles: Zinc-Coated, with 3" minimum lengthwise opening with each end $\frac{3}{16}$ " diameter threaded opening fitted with screw eyes.

2D-10.5 Wrapping Material: First quality burlap, at least 8 oz. in weight or two thicknesses of crinkled paper cemented together with bituminous material. Wrapping material shall be in strips 8 to 10 inches wide. Twine for tying shall be a lightly tarred medium or coarse sisal yarn.

2D-11 SEEDING AND SODDING

2D-11.1 Seed: Seed mixtures shall meet requirements of the Federal Seed Act if carried by interstate commerce, or requirements of the State seed law if procured locally. Containers shall be so labeled by the supplier. Minimum percentages, by weight, of pure seed and germination and maximum allowable percentage of weed seed specified herein have been established by application of tolerances provided under the Federal Seed Act. These requirements shall apply whether seed is used individually or mixed. Seed which fails to meet minimum requirements for purity of germination, or exceeds maximum allowance for weed seed will be rejected.

<u>Kind of Seed</u>	<u>Pure Seed (Minimum)</u>	<u>Germination (Minimum)</u>	<u>Weed Seed (Maximum)</u>
Carpet grass... (Axonopus com- pressus)	89.20 percent	83 percent	0.87 percent
Chewings Fescue (Festuca rubravar.fallax)	95.50 percent	72 percent	0.87 percent
Creeping Red Fescue.....	95.50 percent	72 percent	0.87 percent
(Festuca ruba			
Alta Fescue.....	95.50 percent	72 percent	0.87 percent
Bermuda Grass.....	95.50 percent	77 percent	1.49 percent
(Cynodon dactylon)			
Kentucky Blue Grass.....	80.50 percent	72 percent	1.49 percent
(Poa pratensis)			
Rough Blue grass...	80.50 percent	72 percent	1.49 percent
(Poa trivialis)			
Redtop.....	89.20 percent	83 percent	1.49 percent
(Agrostis alba)			
Italian Ryegrass	96.80 percent	83 percent	0.87 percent
(Lolium multi- florum)			
White Clover.....	94.30 percent	83 percent	1.49 percent
(Trifolium re- pens)			
Blue Gama- grass.....	95.50 percent	77 percent	1.49 percent
(Bouteloua gracilis)			
Lespedeza.....	94.30 percent	83 percent	1.49 percent
(Lespedeza striata)			

2D-11.2 Delivery: Seed mixtures shall be delivered in original sealed

FAA-STD-006

packages bearing the producer's guaranteed analysis for percentages of mixtures, purity, germination and weed seed content.

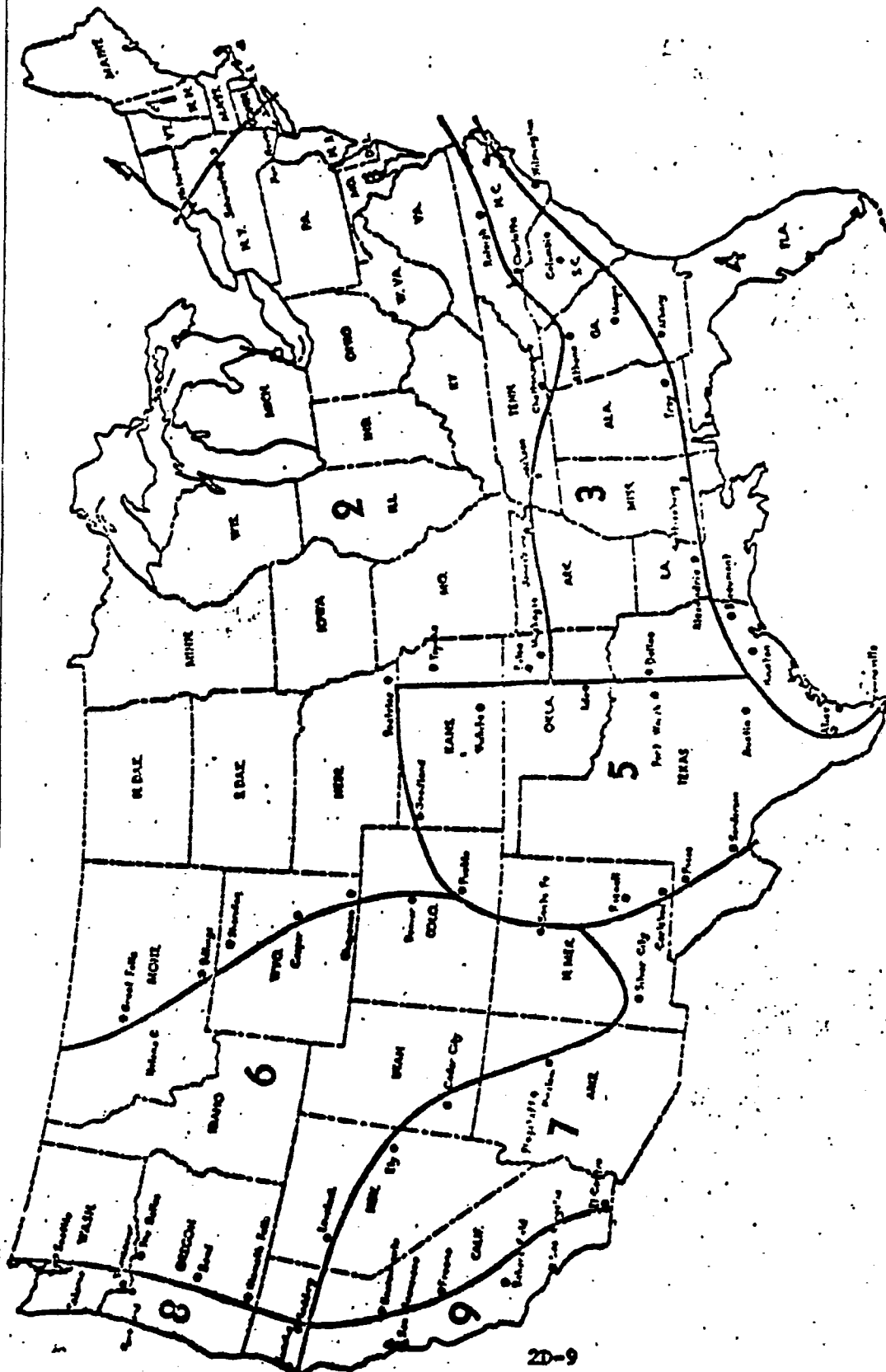
2D-11.3 Type of Seed: Seed shall be one of the "Regular Grass" mixtures specified for the Region in which the Project occurs except that areas subject to shade or restricted sunshine shall be seeded with one of the "Shade Grass" mixtures specified for the Region in which the Project Occurs as indicated on the U.S. Map of Lawn Grass Regions".

2D-11.3.1 Seed Mixtures

<u>Region</u>	<u>Regular Grass</u>	<u>Shade Grass</u>
1	1	12 or 13
2	2 or 3	12 or 13
3	5	14 or 16
4	5, 7 or 8	15
5	4, 6 or 7	None
6	1, 2 or 3	12 or 13
7	1, 6, 7 or 9	None
8	1	12 or 13
9	9, 10 or 11	15

2D-8

40-



U.S. Map of Lawn Grass Regions

2D-9

FAA-STD-006

2D-11.4 Regular Grass Mixtures: Percentages are by weight.

1
95% Kentucky Blue
5% White Clover

6
Bermuda Stolons

2
78% Kentucky Blue
15% Red Top
5% Perennial (Italian) Rye
2% White Clover

7
Centipede Stolons

8
St. Augustine Stolon
(Improved Bitter Blue
variety preferred).

3
90% Kentucky Blue
10% Creeping Red Fescue

9
70% Bermuda seed
30% Red Top

4
Buffalo Grass plugs and
Blue Gamagrass Seed

10
67% Kentucky Blue
33% Red Top

5
Bermuda Stolons and
Carpet seed for Spring and
Summer Seeding;
Bermuda Stolons and Italian
Rye seed for Fall Seeding.

11
67% Kentucky Blue
33% White Clover

2D-11.5 Shade Grass Mixtures: Percentages are by weight.

12
60% Kentucky Blue
30% Chewings Fescue
9% Red Top
1% White Clover

14
Kentucky Blue

13
40% Chewings Fescue
25% Rough Blue
20% Kentucky Blue
15% Red Top

15
St. Augustine Stolons
(Improved Bitter Blue
variety preferred).

16
Carpet Seed

2D-11.6 Time For Seeding: The time for seeding, including the planting of stolons or pieces of sod as well as seeding, shall be done at such times as noted below for the State in which the Project occurs.

2D-10

STATESPRING SEEDINGFALL SEEDINGAlabama
ArizonaFeb. 15 - April 1
Early Summer - June
(When Ground is Warm)Sept. 15 - Oct. 15
Fall (Domestic Rye)
Usually, Oct. 20 -
Nov. 30Arkansas
California
Colorado
Connecticut
Delaware
Florida
Georgia
Idaho
Illinois
Indiana
Iowa
Kansas
Kentucky
Louisiana
Maine
Maryland
Massachusetts
Michigan
Minnesota
Mississippi
Missouri
Montana
Nebraska
Nevada
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
Washington
West Virginia
Wisconsin
WyomingApril 1 - May 1
April 1 - June 1
April 25 - June 1
March 15 - June 1
March 1 - April 30
April 1 - June 30
March 1 - May 15
April 15 - June 15
Feb. 15 - May 1
March 10 - April 15
March 15 - April 15
April 1 - June 1
March 15 - April 15
Nov. 15 - March 15
May 1 - May 15
March 15 - April 15
Feb. 20 - March 20
March 30 - April 20
May 15 - July 15
March 1 - May 1
March 1 - April 30
March 15 - May 30
April 20 - May 15
April 1 - June 15
April 25 - May 25
April 1 - May 1
April 5 - April 15
April 15 - June 15
March 15 - April 30
March 15 - April 15
April 25 - May 5
Feb. 15 - April 15
April 1 - June 1
April 1 - May 15
April 15 - May 30
March 1 - April 30
May 1 - Sept. 15
March 1 - May 1
Jan. 20 - April 20
April 1 - July 1
April 20 - May 1
Feb. 1 - March 15
Feb. 1 - April 30
March 1 - May 15
April 15 - June 10
March 1 - June 1Sept. 15 - Oct. 15
July 1 - Sept. 15
Aug. 15 - Sept. 12
Sept. 15 - Oct. 20
Sept. 15 - Oct. 15(Plant any Month)
Sept. 1 - Sept. 30
Sept. 1 - Nov. 1
Sept. 10 - Oct. 10
Aug. 15 - Sept. 20
Sept. 1 - Nov. 1Aug. 15 - Sept. 10
Aug. 15 - Oct. 15
Aug. 15 - Sept. 20
Aug. 15 - Sept. 10
Sept. 1 - Sept. 15
Sept. 1 - Oct. 1
Oct. 1 - Nov. 15
Oct. 1 - Nov. 1
Aug. 1 - Sept. 15
Sept. 1 - Oct. 1
Aug. 20 - Sept. 15
Aug. 15 - Sept. 30
July 15 - Aug. 15
Aug. 1 - Oct. 1
Sept. 1 - Nov. 30
Sept. 1 - Nov. 30
Aug. 5 - Sept. 15
Sept. 15 - Nov. 15
Sept. 15 - Oct. 15
Sept. 1 - Sept. 15
Aug. 15 - Sept. 15
Feb. 15 - May 31

Sept. 1 - Nov. 1

Aug. 1 - Oct. 1
Oct. 1 - Oct. 20
Sept. 1 - Oct. 15
Sept. 1 - Oct. 31
July 15 - Aug. 15
Oct. 10 - Nov. 10
Sept. 1 - Oct. 15

FAA-STD-006

2D-11.7 Sod: Sod shall be obtained from areas having growing conditions similar to areas to be covered. Sod shall have a clean growth of acceptable grass, reasonably free of weeds, with not less than 1 1/2 inches of soil firmly adhering to roots. Cutting shall be rectangular strips, of equal width, and size to permit being lifted and rolled without breaking. If the soil is dry, sod shall be watered sufficiently to moisten the soil to the depth at which the sod is to be cut. Damping from vehicles will not be permitted. Damaged sod will be rejected. Replanting shall be done within 48 hours after time of harvesting or sod shall be kept damp until planted.

2D-12 SOIL PREPARATION

2D-12.1 Areas to be seeded shall be raked free of stones and debris and compacted by a roller weighing 85 to 100 pounds per linear foot of width, to the minimum depth specified.

2D-12.2 Areas to be sodded shall be disced and raked free of stones and debris, disced again at right angles and raked. Stones or debris over 1 inch in any dimension shall be removed from the premises.

2D-12.3 Ground limestone or agricultural lime shall be spread on the topsoil at the rate of 45 to 50 pounds per 100 square feet and mixed into the soil to a depth of 2 inches before or at the same time the Commercial fertilizer is applied.

2D-12.4 Fertilizer shall be spread at a rate per thousand square feet of area, in accordance with the following table.

5N-10P-5K:	30 lbs.	8N-6P-6K:	20 lbs.
6N-12P-2K:	25 lbs.	10N-6P-4K:	15 lbs.
7N- 7P-6K:	22 lbs.	10N-5P-5K:	15 lbs.

Fertilizer shall be mixed into the soil to a depth of at least 2 inches by disking or harrowing.

2D-13 SEEDING: Surface shall be firmed by raking before seeding. Seed shall be uniformly distributed at the rate of not less than 5 pounds of seed per 1000 square feet of area; 50 percent sown in one direction the remainder sown at right angles to first sowing. Cover lightly by raking and compact the soil by rolling.

2D-14 SODDING

2D-14.1 Banks and slopes with more than 1 foot rise in 3 feet and other areas noted on drawings shall be sodded.

2D-14.2 Soft spots and inequalities in grade shall be corrected.

2D-14.3 Soil shall be watered immediately before sod is planted. Planting shall not be started until the Contracting Officer has approved the condition of the soil. Planting shall be completed before seeding is started in the same area.

2D-12

44

2D-14.4 Sod shall be laid without voids and tamped or rolled. Screened topsoil shall be broomed over entire area and the sod shall be thoroughly watered. The completed surface shall be true to finished grade lines; even and firm at all points. Sod on slopes steeper than 1 or 2 shall be staked with wooden pins about one inch square by 6 inches long, driven flush with top of sod. Stakes shall be placed not more than 18 inches on center.

2D-15 LAWN MAINTENANCE AND PROTECTION

2D-15.1 Lawns shall be protected and maintained by watering, mowing, weeding and replanting as necessary to establish a uniform stand of grass until acceptance by the Government.

2D-15.2 Protect against trespassing and damage of any kind. Promptly renew damaged or washed-out areas. Protect banks from erosion and washing with adequate stabilizing material such as straw or salt hay; renew or replace as necessary.

2D-15.3 During the maintenance period, mow seeded and sodded areas at a height of 2" and at no time allow to exceed 3 1/2".

2D-16 PLANTING

2D-16.1 Plant Materials: As noted on the Drawings.

2D-16.2 Nomenclature: Names of plants required conform to those given in "Standardized Plant Names," prepared by the American Joint Committee on Horticultural Nomenclature. Names of varieties not included therein conform generally with names accepted in the nursery trade.

2D-16.3 Quantities: As necessary to complete planting as shown and located on the drawings.

2D-16.4 Quality and Size: Nursery grown, habit of growth that is normal for the species, sound, healthy, vigorous and free from insects, plant diseases, and injuries. Equal to or exceeding measurements specified in plant list. Plants measured before pruning with branches in normal position; necessary pruning done at time of planting. Sizes and methods of handling according to the code of standards recommended by the American Association of Nurserymen Inc.

2D-16.5 Substitutions: Upon submission of proof that plant is not obtainable, a change order may be procured, without increase in contract price, if authorized by the Contracting Officer providing for use of nearest equivalent size or variety of plant having same essential characteristics.

FAA-STD-006

2D-16.6 Type of Protection to Roots:

2D-16.6.1 Balled and Burlapped Plants: Plants designated "B&B" in plant list dug with firm natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of plant. Balls firmly wrapped with burlap or similar material and bound with twine, cord or wire mesh. Where necessary to prevent breaking or cracking of ball during process of planting, ball to be secured to a platform.

2D-16.6.2 Bare-root Plants: Plants designated "BR" in the plant list dug and the earth removed without injury to fibrous root system. Roots covered with thick coating of mud by puddling or wrapped in wet straw, moss, or other suitable packing material immediately after digging for protection until delivered.

2D-16.7 Protection After Delivery: Balls of "B&B" plants which cannot be planted immediately on delivery covered with moist soil or mulch or other protection from drying. Bare-rooted plants planted or heeled in immediately upon delivery. All plants watered as necessary until planted.

2D-16.8 Pot-Grown Plants: Plants designated pot-grown, with well established root systems sufficient to hold earth together, after removal from pot but not root bound. Size of plant shown on plant list inside diameter of standard pot in which plants have been grown for at least 3 months prior to delivery.

2D-16.9 Heeled in Plants: If heeled in, all bundles of plants opened and the plants separated before the roots are covered and care taken to prevent air pockets among roots.

2D-17 ANTI-DESICANT: Wilt-proof, available from Nursery Specialty Products, Inc., Craton Falls, New York, delivered in the manufacturer's containers and used according to his instructions.

2D-18 TOP SOIL MIXTURE FOR PLANT FITS AND BEDS: Mix materials thoroughly by hand or rotary mixer in the following proportions: 3 parts by volume of topsoil 1 part manure; 1 part sand; and 5 lbs. bonemeal per cubic yard of soil mixture.

2D-19 TIME OF PLANTING: The Contractor shall prepare topsoil for plant pits prior to planting. Planting operations shall be conducted under favorable weather conditions during the next season or seasons which are normal for such work, as determined by accepted practice in the locality of the project.

2D-20 TRANSPLANTING: Move existing trees and shrubs designated on Drawings for utilization elsewhere on project from original location prior to construction operations. If such plants cannot be set in final locations, ball securely, burlap platform and store temporarily in a protected location; protect balls from drying winds and sun by packing in peat moss or leaf mold; individual tree balls are to be boxed to retain this mulch.

2D-14

46

Procedures for transplanting shall be performed in accordance with standard nursery practices, including watering, and prevention of loss of essential feeding roots or injuries to bark, branches or roots.

2D-21 EXISTING TREES TO REMAIN: Where existing trees are designated on Drawing as trees to remain protect by fencing around the area beneath the spread of branches, defining the area for tree root protection. No material shall be stored and no activity is permitted within the fenced area, except as may be necessary to facilitate work of seeding, or the installation of utility lines. Water shall not be permitted to pond within the fenced areas. Infected existing trees shall be sprayed to prevent spread of disease or insect pests to new plantings. Materials and methods used shall not cause injury to persons or structures.

2D-22 PRUNING AND REPAIR: Upon completion of work under this contract, prune all trees and repair injuries. Amount of pruning limited to minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of transplanting operations. Do pruning in such a manner so as not to change natural habit or shape of plant. Make all cuts flush leaving no stubs. On all cuts over 3/4 inch in diameter and bruises or scars on bark, the injured cambium shall be traced back to living tissue and removed; smooth wounds and shape so as not to retain water; coat treated area with an approved tree paint.

2D-23 OBSTRUCTIONS BELOW GROUND: Locate new planting where shown on plans excepting where obstructions below ground are encountered or where changes have been made in the construction; then necessary adjustments as approved by the Contracting Officer will be made. No planting except ground cover to be placed closer than 18 inches of pavements and structures. Necessary changes in location must be approved in writing prior to planting.

2D-24 PLANTING - GENERAL

2D-24.1 Planting pits dug and soil for planting to be ready before plants are delivered. Excavate circular pits with vertical sides for all plants. Make diameter of pits for all plants at least one foot greater than the diameter of the ball. Make depth of pits for trees, shrubs and vines sufficient to accommodate ball or roots when plant is set to finished grade allowing 3 inches of compacted prepared topsoil in the bottom of pit as shown in planting details.

2D-24.2 Set plants upright and faced to give the best appearance or relationship to adjacent structures. Do not pull burlap from under balls. Remove wire and surplus binding from top and sides of balls. Spread roots in normal position. Cut off all broken or frayed roots cleanly. Place and compact prepared topsoil carefully to avoid injury to roots and to fill voids. When hole is nearly filled, add water as necessary and allow to soak away. Fill hole to finished grade and form shallow saucer around plant by placing ridge of topsoil around edge of pit. After ground settles, fill with additional soil to level of finished grade.

FAA-STD-006

2D-24.3 Dispose of excess excavated material off site.

2D-24.4 Trees: Where applicable, plant trees before surrounding smaller plants and ground covers are in place. Where trees are shown on Drawing aligned with equal spaces between trees, adjust interval between trees as necessary to keep trees evenly spaced unless otherwise directed.

2D-24.5 Shrubs: Plant on centers as indicated with spacing adjusted if necessary to evenly fill bed using specified quantity of plants.

2D-24.6 Hedges: Plant in trenches excavated at least 4 inches deeper and 12 inches wider than spread of roots or diameter of balls. Adjust spacing if necessary to fill trench evenly with indicated quantity of plants.

2D-24.7 Ground Covers: Plant in beds having minimum 8 inch depth of prepared topsoil with 2 inch depth of peat spread on bed and thoroughly mixed into soil to depth of 6 inches before planting. Treat ground cover beds after preparation for planting, but before any plants are installed within bed area, with Vapam, granular calcium cyanamide or approved equal to destroy weed seeds. Apply according to manufacturer's directions delaying planting for the recommended minimum period to allow dissipation of herbicide. Space plants so that indicated quantity evenly fills ground cover bed.

2D-24.8 Mulch: Trees and planting beds provided with 2 inch layer of mulch within 2 days after planting and kept at this depth throughout maintenance period. Mulch to entirely cover area of saucer around each tree.

2D-24.9 Guying, Staking and Wrapping: Support trees immediately after planting. All trees supported and wrapped, as shown in details.

2D-24.9.1 Guying: Guy trees at points of branching with 3 wire guys spaced equally around and outside perimeter of ball. Cover guy wires with rubber hose or protect bark with approved material at points of contact. Position each guy below crotches and fasten to wood dead man, 18" below grade. Provide one turnbuckle for each guy.

2D-24.9.2 Staking: Support trees without adequate room for guying by 3 stakes, placed in a triangle at perimeter of ball and to sufficient depth to hold tree rigid. Drive stakes vertically, do not twist or pull. Wire tree to top bracing members. Provide rubber hose protection as specified above for guying.

2D-24.9.3 Wrapping: Promptly after planting, trunks of trees wrapped spirally from ground line to height of second branches. All wrappings neat and snug and material held in place by twine at top and bottom.

2D-24.10 Spray: Spray to retard transpiration before digging of each tree, with anti-desiccant, using power sprayer to apply an adequate film over trunks, branches, twigs and foliage.

2D-25 MAINTENANCE

2D-25.1 The Contractor shall be held responsible for the maintenance of all work and parts thereof prior to the issuance of the Certificate of Final Acceptance. No trees or shrubs will be accepted unless they show a healthy growth and satisfactory foliage conditions.

2D-25.2 Maintenance shall include watering of lawns, trees and plants, cultivation, pruning, weeding, mowing, spraying, pruning of trees and shrubbery, cleaning up, edging, repairs to guy wires, stakes and wrappings, guards, repairs of minor washouts and gullies to six inches, and all other necessary work of maintenance.

2D-25.3 During the maintenance period and up to the issuance of Certificate of Final Acceptance, the Contractor shall do all seasonal spraying of trees and shrubbery as required principally:

2D-25.3.1 Arsenate of lead spray for caterpillars and chewing insects. Arsenate of lead in powder form shall be used at the rate of two (2) pounds to fifty (50) gallons of water with one (1) pound of Casein Sticker added.

2D-25.3.2 Bordeaux Mixture, dry powder form for fungus and leaf disease. For Leaf blight on Plane trees. Rate: 6 to 8 pounds to 50 gallons of water.

2D-25.3.3 Fish-oil soap, for scale on thorns and flowering crabs. Rate: 1 pound to 10 gallons of water.

2D-25.3.4 Lime-sulphur, liquid form, for scale dormant spray. Rate: 1 gallon to 10 gallons of water.

2D-25.3.5 Nicotine-sulphate plus Volchk's nursery spray. For wooly aphis on thorns, flowering crabs and others. Rate: 1/2 pint nicotine sulphate plus 2 quarts of Volchk's nursery spray to 50 gallons of water. Spraying as listed may be varied as required under special conditions.

2D-26 REPLACEMENTS:

2D-26.1 Any trees, shrubs or vines not found to be in a healthy growing condition, at any time during the period of guaranty shall be removed from the Site and replaced during the immediate planting season following the notification by the Contracting Officer.

FAA-STD-006

2D-26.2 Plant replacements shall be of the same kind and size as specified in the Plant List. All plant replacements shall be inspected, sealed, furnished, planted and mulched as specified, at the Contractor's expense. All paved areas shall be kept clean at all times.

2D-26.3 Where trees are replaced, the Contractor shall be responsible for replacing any pavements damaged or removed.

2D-27 CLEAN UP

2D-27.1 The Contractor shall remove from the Site all subsoil excavated from his work and all other debris, including but not limited to branches, rocks, paper and rubbish in all landscape areas as the work proceeds.

2D-27.2 All areas shall be kept in a neat and orderly condition at all times. Prior to final acceptance, the Contractor shall clean up the entire landscaped areas to the satisfaction of the Contracting Officer.

2D-28 COOPERATION

2D-28.1 Cooperate and coordinate work with that of other trades supplying materials or performing work in contact with, connecting to, underlying or overlaying the work of this Section.

2D-28.2 Provide complete data of requirements for work under this Section to those other trades whose work is affected by, or dependent upon, the work of this Section.

2D-28.3 Provide to the job or install in place, or both, any and all items required to be built into other work in ample time to avoid delaying the normal progress of such other work.

2D-29 VERIFYING CONDITIONS

2D-29.1 Visit the site, verify all conditions covering or affecting the work of this Section. Verify all dimensions.

2D-29.2 Examine all drawings covering the work of this Section and refer to all other drawings, including mechanical and electrical drawings, which may affect the work of this Section or require coordination by this trade.

2D-29.3 Before starting any work, make a thorough examination of those portions of the Project in which the work of this Section is to be performed. Check all work adjoining or underlying locations in which the work of this Section is to be installed. Report any and all conditions which may interfere with or otherwise affect or prevent the proper execution or completion of the work of this Section. Do not commence any work until any all such conditions have been corrected by the trade or trades responsible.

2D-30 GUARANTEES

2D-30.1 The Contractor shall guarantee, in writing, all workmanship and materials (except for lawns) for two years from date of final acceptance.

2D-30.2 At any time within the period of the guarantee, the Contractor shall replace any plant which, for any reason, has died or is in a dying condition, or which has failed to flourish in such a manner or in such a degree that its usefulness or appearance has been impaired; and he shall further make good any other damage, loss, impairment, or defect in materials or work where the loss, impairment, destruction or failure to flourish sufficiently is the result of inferior or defective materials or workmanship or unfavorable weather conditions. The Contractor shall also make good all damage to persons or property caused by defective workmanship or materials.

2D-30.3 After the completion of any work, the Contractor shall, from time to time, inspect the water, cultivation, and other maintenance operations carried on by the Government or its agents with respect to such work, and promptly report to the Contracting Officer any methods, practices or operations which he considers unsatisfactory, and not in accord with his interests or good horticultural practice. The failure of the Contractor so to inspect or report shall be construed as an acceptance by him of the Government's or its agents maintenance operations, and he shall not thereafter claim or assert that any defects which may later develop are the results of such methods, or practices or operations.

* * *
2D-19

51
52-BK

DIVISION 3SECTION ACONCRETE AND CEMENT WORK

3A-01 SCOPE: The work covered by this Section consists in furnishing all plant, labor, materials, tools, equipment, appliances, and services required to manufacture, deliver, furnish and install concrete and cement work, and related work, complete, in strict accordance with this Section and the applicable drawings.

3A-02 APPLICATION: Requirements herein for mixing, placing, curing and finishing concrete govern all concrete work in all Section's.

3A-03 GENERAL: For location and extent of work, see drawings.

3A-04 COOPERATION

3A-04.1 Cooperate and coordinate work with all trades supplying materials or performing work in contact with, connecting to, underlying or overlying work of this Section.

3A-04.2 Provide complete data of requirements for work under this Section to those trades whose work is affected by, or dependent upon, the work of this Section.

3A-04.3 Provide to the job or install in place, or both, any and all items required to be built into other work in ample time to avoid delaying the normal progress of such other work.

3A-05 VERIFYING CONDITIONS

3A-05.1 Visit the site; verify all conditions covering or affecting the work of this Section. Verify all dimensions.

3A-05.2 Examine all drawings covering the work of this Section and refer to all other drawings, including mechanical and electrical drawings, which may affect the work of this Section or require coordination.

3A-05.3 Before starting work, make a thorough examination of those portions of the structure in which the work of this Section is to be performed. Check all work adjoining or underlying locations in which the work of this Section is to be installed.

3A-06 SUPERVISION

FAA-STD-006

3A-06.1 During progress of concrete work, provide competent superintendent, acceptable to the Government's Representative, thoroughly experienced in cast-in-place reinforced concrete work, who has been authorized to receive and execute orders of the Government's Representative.

3A-06.2 Duty of superintendent is: to see that all plans, specifications and instructions from the Government's Representative are strictly carried out; supervise installation of all steel reinforcing; check that all formwork has been properly prepared, installed, and cleaned to receive concrete and to provide architectural and structural concrete finishes approved by the Government's Representative; certify that all joints are in proper locations; and check that correct mixture of concrete is used in each specific location.

3A-07 REGULATIONS, REFERENCES, AND STANDARDS

3A-07.1 Have available in field at all times for reference, latest editions of following regulations, standards, etc., which are included in and made part of these specifications subject to any qualifications herein:

- (a) Governing Local Building Codes.
- (b) "Building Code Requirements for Reinforced Concrete" (American Concrete Institute 318).
- (c) "Manual of Standard Practice for Detailing Reinforced Concrete Structures" (American Concrete Institute - 315).
- (d) "Recommended Practice for Winter Concreting" (American Concrete Institute - 604).
- (e) "Recommended Practice for Hot Weather Concreting" (American Concrete Institute - 605).
- (f) "Recommended Practice for Selecting Proportions for Concrete" (American Concrete Institute - 613).
- (g) "Recommended Practice for Measuring, Mixing and Placing Concrete" (American Concrete Institute - 614).
- (h) "Consolidation of Concrete" (American Concrete Institute - 609).
- (i) "Formwork for Concrete" (American Concrete Institute - 662 and SP-4).
- (j) "Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers Bureau" (National Ready Mixed Concrete Association - Ref. 51).

- (k) "Standards for Operation of Truck Mixers and Agitators" (National Ready Mixed Concrete Association - Ref. 52).
- (l) "Standard Specifications for Ready Mixed Concrete" (ASTM C-94).
- (m) "Recommended Practice for Cold Weather Concreting" (American Concrete Institute - 306).

3A-07.2 Where reference is made to Specifications of American Society for Testing Materials (ASTM) or other specific standard, furnish material and/or work in strict accordance with reinforced standard.

3A-07.3 In event of discrepancies between various regulations and standards referred to above, the most stringent requirements shall govern.

3A-08 REJECTIONS

3A-08.1 Defective material may be rejected at any time whether in place or not. Promptly remove and replace rejected material.

3A-09 MEASUREMENTS

3A-09.1 Lay out work in strict accordance with drawings and be responsible for correct location of same. Offsets in any exposed concrete work are not permitted unless so indicated in the drawings. Lay out from at least two pre-established bench marks and axis lines, and individually correct for length and width.

3A-09.2 Align and correspond all exposed concrete joints.

3A-10 TOLERANCES -TOWER SHAFT

3A-10.1 Variation from plumb and elevation in any direction in any single level shall not exceed 1/4".

3A-10.2 Finish tops of walls with steel trowel, tool edges to uniform elevation, and check finally with a straight edge.

3A-10.3 Maintain concrete sections in an alignment such that all faces shall conform to the vertical curve or plane. Where it is necessary to correct for misalignment, humor sections without offsets.

3A-10.4 A maximum tolerance of 1/4" in 12'-0" will be permitted in floors and ceilings, not cumulative.

FAA-STD-006

3A-10.5 Camber forms and shores for beams and slabs $1/4"$ for each 15'-0" of span, unless otherwise noted on drawings. Camber top surface and set screeds to maintain uniform thickness.

3A-10.6 Tower Formwork(a) Outside Curved Surfaces:

- (1) Variation from plan dimension at any point - $1/4"$.
- (2) Variation from grade at each horizontal lift joint - $1/4"$.
- (3) Variation from grade for entire tower - $3/4"$.
- (4) Variation of any 1" x 4" board from level - $1/8"$.
- (5) Deflection between supports - $1/360$ of span.
- (6) Variation of level between adjacent boards - $1/16"$.
- (7) Relative variation from curve between adjacent boards $1/16"$.
- (8) Variation from plan position to entire structure - 1".

(b) Inside Vertical Surfaces:

- (1) Variation from plumb for each lift - $1/4"$.
- (2) Variation from plumb for entire tower - $3/4"$.
- (3) Variation from grade at each horizontal lift - $1/4"$.
- (4) Variation from grade for entire tower - $3/4"$.
- (5) Variation from plan position for each lift - $1/2"$.
- (6) Variation from plan position for entire structure - 1".
- (7) Variation in size and locations of sleeves, openings and inserts - $3/8"$.
- (8) Variation in wall and slab thickness - minus $1/4"$ and plus $1/2"$.

3A-11 TOLERANCES FOR CONCRETE WORK OTHER TOWER SHAFT

3A-11.1 Foundations for Base Building and Connecting Corridor: All concrete surface shall be finished within a tolerance of $1/2$ inch in 10 feet;

provided that such deviation does not effect the architectural or structural portions of the buildings super structure. Where foundation alignment must be maintained due to architectural or structural requirements, the concrete shall be finished to a tolerance of 1/4 inch in 10 feet.

3A-11.2 Slabs for Base Building and Connecting Corridor: Concrete slabs shall be true plane surfaces finished with a tolerance of 3/8 inch in 10 feet.

3A-12 TEST PANELS

3A-12.1 At the earliest possible time and before commencement of any concrete which will be visible in the finished structure, construct complete, and finish a test panel as shown on the drawings cast in two lifts at a location on the site selected by the Government's Representative. Use a prototype of the forms and the same concrete materials, steel reinforcement, form ties, methods of construction, and finish as will actually be incorporated in the exposed concrete. Have present during this construction the superintendent and foreman mechanics who will be engaged on the actual work. Written approval of the test panel must be secured from the Government's Representative before commencing work on the exposed concrete. The approved test panel will serve as a standard of acceptance for the exposed concrete work.

3A-12.2 Apply to the approved test panel samples of patching mortar and grout for approval of color, texture and technique. Sandblast the test panel to demonstrate texture, technique and selection or penetration. Work must be approved by the Government Representative prior to actual work on the concrete which will be visible in the finished structure. After acceptance, apply water repellent for approval of material and method of application.

3A-13 SHOP DRAWINGS

3A-13.1 General: Shop drawings shall be submitted for all formwork and all reinforcing steel. The Contractor is not permitted to erect or use any formwork for concrete that has not received the written approval of Government Representative.

3A-13.2 Reinforcing Steel: Prepare and submit shop drawings showing positioning and reinforcement of concrete slabs, beams, walls, openings through concrete work, etc.; indicate elevations of foundation and retaining walls showing top and bottom levels, ledges, beam seats, pits, trenches, etc., and give all pertinent dimensions and levels tying the features into the structure. Show sizes, placing, bending, splicing and lengths of all reinforcement detailed in accordance with ACI-315. Do not fabricate until shop drawings have received written approval of the Government Representative.

FAA-STD-006

3A-13.3 Tower Formwork

- (a) Design Criteria: Design formwork for following stresses and performance.
- (1) Not less than full hydrostatic pressure of concrete (full head) plus superimposed live and vibration loads.
 - (2) Not less than 40 mile per hour wind pressure of six pounds per square foot.
 - (3) Limit maximum deflection to .004 of span between structural members except curved surfaces limited to .0025 of span.
 - (4) Positive means of adjustment to allow proper alignment at each lift and matching of corner boards when adjacent faces meet.
 - (5) Corner joints of boards in outside contact form surfaces for curved wall faces capable of being tightly compressed to prevent mortar leakage.
- (b) Submissions: Submit formwork shop drawings complete in all respects showing bracing arrangements, lumber cutting lists, methods of aligning, forms, erection and stripping procedures, design criteria, location of inserts, ties, sleeves, etc., and gages, sizes, compositions and grades of all forming materials and components. Also submit drawings or a description of the method of shoring proposed for floor slabs and all horizontal concrete members. Arrange shoring for all concrete members above grade so that it is supported on uncompactible surfaces. Shoring on uncompacted fill is not allowed.
- (c) Approval: by the Government Representative is general in nature and does not in anyway relieve the Contractor's responsibility for the design, construction, stability or adequacy of the formwork and shoring and for furnishing all certifications required by local building authorities.

3A-14 NOT USED

3A-15 STORAGE OF MATERIALS

3A-15.1 General: Store unpackaged materials on clean platforms and protect from deterioration and intrusion of foreign matter with suitable covers. Immediately remove damaged material.

3A-15.2 Cement: Store in weathertight structure with floor not less than 1 ft. above ground. Provide easy access for proper inspection and identification of material. Remove hydrated or partially set cement from site immediately.

3A-15.3 Aggregates: Store fine and coarse aggregates separately and prevent segregation of sizes. Avoid intrusion of dirt or foreign materials. Provide screens for sifting. Stockpile aggregates at least 24 hours on site before using.

3A-15.4 Reinforcing Steel and Accessories: Take care to protect against soiling, undue corrosion, and deformation. Store in manner to facilitate selection and minimize rehandling.

3A-16 CEMENT AND AGGREGATES

3A-16.1 Tower Shaft and Concrete Exposed to Weather:

- (a) Cement: ASTM C-150, Type I. Cement must contain less than 0.6 per cent alkalis calculated as sodium oxide or contain an addition of a material that has been shown to prevent harmful expansion due to any alkali-aggregate reaction. Use one brand of cement. After selection, take necessary steps to insure uniform color and place on order sufficient quantity to complete the work. Furnish copies of mill tests of all cement. Avoid cement temperatures above 110 degrees F. Balling of concrete due to hot aggregates, water, cement, or any other condition is prohibited. Cement for architectural concrete shall be supplied by one of the following manufacturers and of the type indicated:

- (1) Coplay Cement Manufacturing Co.
Coplay, Pennsylvania
Saylor's Type I

FAA-STD-006

- (2) Universal Atlas Cement
Hudson, N. Y. Plant
Type I (light buff)
- (3) Penn Dixie Cement Corp.
Plant No. 6H (Howes Cave, N. Y.)
Type I (light buff)
- (4) Universal Atlas Cement
Universal Plant (Pittsburgh, Pa.)
Type I-S (buff)
- (5) Marquette Manufacturing Co.
Pittsburgh (Neville Island Plant)
Type I-S (buff)
- (6) Marquette Manufacturing Co.
Hagerstown (Security) Md.
Type I (light buff)
- (7) Ideal Cement Co.
Houston Plant
Type I

Other cements, or blends of dark and light cements and/or pozzolanic material, will be considered if it can be demonstrated to the satisfaction of the Government's Representative that the resulting concrete will exhibit color, tone and other physical characteristics similar to those obtained by the cements specified above.

- (b) Entrained Air: Air entrain all freshly mixed concrete and determine content in accordance with ASTM C-231. Adjust proportions when batching and maintain desired yield and cement factor. Maintain air entrainment at more than 4% and less than 7%.
- (c) Coarse Aggregate: ASTM C-33, gradation No. 67, uniformly graded, maximum size 3/4", clean, hard, durable, uncoated particles free of deleterious materials emanating from the same basic source throughout the job. Furnish affidavits verifying that aggregates are supplied from a source approved by the governing Department of Highways or Public Works for exterior exposure. Slag is not permitted. Submit a service record of at least 10 years verifying that the aggregate is not potentially alkali reactive and demonstrates proven durability to freezing and thawing. These aggregates when tested by petrographic analysis (ASTM C-295) by a recognized geologist shall be durable and non-alkali reactive. If there is any question of durability, the aggregates must be freeze-thaw tested to ASTM C-290 and Contractor must demonstrate aggregate meets its limits.

- (d) Fine Aggregate: ASTM C-33, clean, hard, durable, uncoated grains free of deleterious materials and of uniform color emanating from the same basic source throughout the job. Fineness Modulus shall not be less than 2.60 or greater than 2.80. Affidavits and service records governing coarse aggregate apply to fine aggregate.
- (e) Admixtures: Admixture other than air entrainment is not permitted.

3A-16.2 Base Building, Connecting Corridor and Other Concrete Work:

- (a) Cement: Cement shall be portland cement conforming to ASTM C 150 Type I. Type III, High Early Strength, may be used with the approval of the Government Representative. Only one brand of approved cement shall be used.
- (b) Aggregates: ASTM C-33, clean, hard, durable particles, maximum size 3/4" for floor slabs and equipment bases, 1 1/2" for footings and foundation walls.
- (c) Admixtures: The concrete shall contain admixtures of pozzolan and an air-entraining agent as specified in 3A-18.2.

3A-16.3 Mixing Water: Potable, clean, free from oil, acid and injurious amounts of vegetable matter, alkalies or other salts. Use water from approved source.

3A-16.4 Test of Aggregate: Furnish data indicating aggregate for all concrete are not potentially alkali reactive and evidence of durability to freezing and thawing for all exposed concrete.

3A-17 CONCRETE MIXES FOR TOWER SHAFT

3A-17.1 Specific Requirements: Allowable stresses for the design of concrete work are based on the specified minimum 28 day compressive strength of the concrete, or on the specified minimum compressive strength at the earlier age at which the concrete may be expected to receive its full load. The strengths of concrete at specified ages for which all parts of the concrete work were designed are shown on the drawings.

3A-17.2 Responsibility: Contractor is solely responsible for creating design mixes fully workable, of required strengths, that produce finishes acceptable to the Government's Representative.

3A-17.3 Submission of Aggregate and Cement Samples: In order to guide the Contractor in selecting the appropriate cement and aggregates, there is on display at the Contracting Officer's office, a sample panel which indicates the required colors and texture desired in the finished

FAA-STD-006

exposed concrete after sandblasting. This panel was made with buff cement (Saylor's I manufactured in Coplay, Pennsylvania), tan sand and crushed stone. The finished exposed concrete work shall generally match this panel in color and texture.

- (a) Within 3 weeks from date of Notice to Proceed, the Contractor shall deliver to the Government's Representative, not less than three 1-quart samples, each, of different cements fine aggregates and coarse aggregates which comply with these specifications, supported by the necessary verifying data, and which will in combination with each other produce the color and texture of concrete to match the sample at the office of the Contracting Officer. Within two weeks after receipt of the materials at the laboratory, the Contractor will be advised of the specific cements and aggregates acceptable for use in the concrete design mixes.
- (b) Within 2 weeks from notice of acceptable materials, the Contractor shall submit at the site, for approval and acceptance by the Contracting Officer, three sample panels, each 12" X 12" x 3" deep, cast in plastic faced plywood forms and then sandblasted to show the texture of the concrete. The Contractor will be required to use the cement and aggregates used in making the approved samples for the casting of exposed finished concrete.

3A-17.4 Design Mix Requirements: Contractor is responsible for furnishing all design mixes required. Submit design mix and laboratory tests to the Government's Representative for approval. Use only aggregates proposed for finished work. Tests to be approved by the Government's Representative include aggregate soundness and gradations, 6 compression tests at 7 and 28 days, percentage of air entrainment, and slumps for each design mix. Do not begin concrete work until design mixes and test results have been approved by the Government's Representative. Prepare and submit 4 point curves for approval of Contracting Officer. Laboratory cured samples tested must indicate strengths at least 15% higher than those specified on drawings. With the submission of the design mix and laboratory tests for the concrete which will be visible in the finished structure, the Contractor shall ship prepaid to the Governments' Laboratory the following samples of the actual materials he proposes to use: - 1bag (94 lbs.) of cement, 300 lbs. coarse aggregate and 400 lbs. fine aggregate.

- (a) Design mixes in accordance with "Recommended Practice for Selecting Proportions for Concrete" (ACI 613-54) subject to this Schedule:

Fineness Modulus of Sand

Volume of Coarse
Aggregate per Unit
Volume of Concrete
(b/bo)

2.60
2.70
2.80

0.73
0.72
0.71

3A-10

62

3A-17.5 Proportioning and Consistency: Proportion cement to aggregate on a weight basis to produce densest possible mix with the minimum water requirement.

- (a) Tower Concrete: Maximum slump 4"
with not less than 6½ (611 lbs.) bags of cement or more than 6 gallons of water per bag of cement including surface water carried by the aggregates. Air entrain at limits specified.

- (b) The Contractor must satisfy himself, that he is capable of producing concrete of satisfactory quality, free of voids, honey-combing, or excessive air bubbles with these slumps. Execution of this contract signifies that the Contractor is responsible for the production of concrete of satisfactory quality within the slump limitations specified.

3A-18 CONCRETE MIXES FOR BASE, CONNECTING CORRIDOR AND OTHER CONCRETE WORK

3A-18.1 Concrete Quality: The design of the concrete mixture shall be approved by the Government Representative and shall have a minimum 28-day compressive strength as indicated on the drawings when tested in accordance with ASTM C39 (Test for compressive strength of molded concrete cylinders). The concrete mixture shall be designed to give the most economical and practicable combination of the available aggregates, cement, water and admixture. The resultant mixture shall have the required strength, durability, and hardening qualities and be of a consistency and workability suitable for the conditions of the job. The design, mixing, pouring and curing shall be in accordance with the standards of the American Concrete Institute and the Portland Cement Association.

3A-18.2 Concrete Admixtures: The pozzolith admixture shall be added in accordance to ASTM C340 (Specifications for Portland - Pozzolan cement) and the Pozzolith material shall be equal to that manufactured by the Master Builders Company of Cleveland, Ohio. The air-entraining agent may be included in the cement manufacture process or added during the concrete mixing process and shall be in accordance with ASTM C 175 (Specifications for air-entraining Portland cement). When the air entraining admixture is batched in solution in a portion of the mixing water, the air content shall be not less than 3 per cent nor more than 6 per cent of the volume of the concrete. All air-entraining additions shall comply with ASTM C260 (Specifications for air entraining admixtures for concrete) and ASTM C226 (Specifications for air-entraining additions for use in the manufacture of air-entraining Portland cement).

FAA-STD-006

3A-18.3 Water Content: The water content of all concrete mixtures shall be the minimum necessary to properly place the mixture and shall not exceed 5½ gal. per sack of cement (air-entrained concrete), including the free surface moisture of the aggregates. The indiscriminate addition of water to delayed batches or to batches which have dried and become stiffer than the usual consistency is prohibited.

3A-18.4 Control: The proportions of all materials entering into the concrete shall be in conformance with the approved mix. The proportions shall be changed whenever such change is determined necessary by the Government Representative to maintain the standard of quality required for the concrete. All materials shall be measured by weight except the air-entraining admixture and water, which may be measured by volume. The cement content of concrete shall range from a minimum of 5 to a maximum of 6½ bags per cubic yard.

Concrete mixtures shall be designed to give the most economical and practicable combination of the available aggregates, cement, water, and admixture, that will produce a mixture, having the required strength, durability, and hardening qualities, and be of a consistency and workability suitable for the conditions of the job.

3A-18.5 Batching and Mixing: Concrete may be (a) mixed in a batch type mixing plant at the site, (b) truck mixed, (c) completely mixed at a central ready-mix plant, or (d) partially mixed at a central ready-mix plant. The method used shall insure the production of uniform batches and the mixer used shall not leak mortar or waste materials during the charging, mixing, or discharging operations. The mixing equipment shall be capable of combining the cement, aggregates, water, and air-entraining agent into a thoroughly mixed and uniform mass within the specified time, and of discharging the mixture without segregation. All batching and mixing equipment shall be provided with adequate facilities for accurate measurement and control of each of the materials entering the concrete. All ingredients of the mix shall enter the mixer preferably pre-mixed dry and in such a manner as to avoid "Gumming". If not premixed, the ingredients shall enter the mixer uniformly as possible at the same time. The Government Representative shall have free access to the batching and mixing equipment at all times.

3A-19 INSPECTION AND TESTING

3A-19.1 Concrete testing shall be the Contractor's responsibility and shall be made by a testing Agency acceptable to the Government's Representative. All costs shall be borne by the Contractor.

FAA-STD-006

3A-19.2 Tests for Tower Shaft: The Testing Agency shall make the following tests for each 50 cubic yards of concrete or fraction thereof placed, but not less than one set for each day's placing. When more than one type of structural or architectural concrete is being placed, tests shall be made for each mix.

- (a) Compression Test (ASTM C-31 and C-39): Six standard 6" x 12" cylinders. Three cylinders are to be tested at 7 days, and three cylinders at the age of 28 days.
- (b) Air Entrainment (ASTM C-138 or C-173): At least two tests shall be made for each day's placing and as often in the opinion of the Government's Representative, when a change in consistency of the concrete mix is noted.
- (c) Slump Test (ASTM C-143): Test for slump shall be made periodically or when any cylinders are made and as often in the opinion of the Government's Representative when a change in consistency of the concrete mix is noted.
- (d) The test specimens shall be clearly marked and the system of marking shall have a definite sequence.
- (e) The test specimens shall be carefully stored and transported so as not to damage them in any way. The Contractor shall provide an insulated shed for the storage of the cylinders.
- (f) Records shall be kept identifying each cylinder with the locations of the concrete from which the test specimens were taken.
- (g) Specimens shall be cured under laboratory conditions except that when, in the opinion of the Government's Representative, there is a possibility of the surrounding air temperature falling below 40 degrees F., he may require additional specimens to be cured under job conditions.

3A-19.3 Tests for Base, Connecting Corridor and Other Concrete Work: When directed by the Government Representative, concrete samples taken from the concrete already deposited in the forms shall be taken during the pouring operation. The location in the work where the samples were taken and the date the samples were taken shall be recorded by the Government Representative for future reference. The samples shall be used for the measurement of the consistency of concrete by the slump test and the measurement of the compressive strength at 28 days by testing the specimen in a testing machine. The slump test sample and the slump test shall be in accordance with ASTM C-143 and the compressive test sample, curing and compressive testing shall be in accordance with ASTM C-31 and C-39 except that the samples shall be taken from the concrete which has already been deposited in the forms.

FAA-STD-006

3A-19.4 Job Inspection: The Testing Agency shall provide a qualified inspector at the site to see that all structural and architectural concrete and related work is thoroughly mixed and properly placed. It shall be the responsibility of the inspector to control the consistency of the mix in order that there will be no segregation due to excessive water, and to supervise for the proper vibration of the concrete.

- (a) The inspector shall take periodic air and slump tests as directed by the Government's Representative, fabricate test cylinders, be responsible for the handling, storing and field curing of the cylinders while on the site and see that cylinders are properly packed for shipment to the laboratory and that the cylinders are shipped at the proper time.
- (b) Equipment for testing the air content of the concrete and a slump cone shall be kept at the site at all times.

3A-19.5 Reports: The following reports shall be furnished.

- (a) Reports of all tests, as completed.
- (b) Weekly reports on amount of concrete placed each day; reports shall include air temperatures and weather conditions for each 24 hour period during curing operations.
- (c) Such other reports as the Government's Representative may direct or that may be required.
- (d) The Testing Agency shall immediately report to the Government's Representative any discrepancies found in the work.

3A-19.6 Strengths: If strength of laboratory control cylinders at 7 or 28 days for any portion of work falls below compressive strengths called for, the Government's Representative has the right to order a change in proportions or of water content for the remaining work; or he may order reshoring and additional moist curing of the sections in question. In addition, at his discretion, the Government's Representative has the right to require tests in accordance with ASTM C-42 (cored cylinders), or order load tests on portions of building so affected. Perform all changes as noted above and/or other required corrective measures as directed by the Government's Representative at no expense to the Government.

3A-20 MATERIALS

3A-20.1 Reinforcing and Steel and Accessories:

- (a) Submit mill reports to the Government's Representative before placing steel in forms.

3A-14

66

- (b) Reinforcing Bars: All tower reinforcing shall be of intermediate grade new billet steel, ASTM A-15 having a minimum yield point of 40,000 psi. Deformations shall conform to ASTM 305-53T. Strength grade shall be branded on each bar. All reinforcement steel shall be cut and bent to the dimensions shown on the drawing. All bars shall be bent cold, by approved machine methods, and shall be in accordance with standard approved practice. Fabrication of the reinforcement steel shall be in accordance with ACI-315 (Manual of Standard Practice for Detailing Reinforced Concrete Structures).
- (c) Light Wire Mesh: 14 gauge 2 x 2" square, 21 lbs. per 100 square feet, hot dipped galvanized.
- (d) Welded Wire Mesh: ASTM A-185, hot dipped galvanized, cold drawn round steel wire having a minimum tensile strength of 70,000 psi and conforming to ASTM-A82.
- (e) Reinforcing Bar Accessories: Plastic of approved color for all chairs, slab bolsters, spacers, high chairs, screeds and similar items coming into contact with form surfaces, or producing concrete that is exposed, receives plaster skim coat, or is painted, similar to "Rustless", "Sylgab" or approved equal. Elsewhere use hot dipped galvanized.
- (f) Form Ties:
- (1) General Use: Cadimum plated or hot dipped galvanized adjustable type, completely removable or removable to a minimum depth of 1½" from surface leaving hole no larger than 1-3/8"; minimum safe working strength 5000 pounds. Locate in level horizontal rows, plumbed vertically, and in symmetrical arrangement with openings and jointing. The tie layout in architectural concrete in the tower shall be as shown on drawings. No snap ties or wire ties shall be used in architectural (exposed finished tower shaft interior and exterior) concrete.
- (2) Tower Curved Wall Surface Formwork: Minimum ultimate strength 12,000 pounds with minimum 5/8 " diameter rod threaded at each end tapering in not more than 18" from 5/8" in front to 3/4" in back and fitted with nut washers and capable of completely sealing hole in outside board form, similar to product manufactured by Superior Concrete Accessories or approved equal. Ties must pass only through centers of 1" x 4" boards and never at joints. Ties shall not exert a bearing pressure of over 760 psi on wood members based on ultimate strength specified. Arrange ties in a symmetrical pattern similar to the general lay out indicated in the drawings.

FAA-STD-006

- (g) Form Bolts: Cadmium plated or hot dipped galvanized, ASTM A-307, Use washers against wood.
- (h) Inserts: For fastening shelf angles: hot dipped galvanized malleable iron adjustable wedge type with 3/4" bolt complete with necessary "Horseshoe" washer.
- (i) Flashing Reglets: Hot dipped galvanized #22 gauge metal, felt filled.

3A-20.2 Premolded Filler: Self expanding cork board, ASTM D-1752, Type III and of Serviced Products Corporation, Code 4324 or Equal of thickness and length indicated. Provide fillers wherever indicated on drawings. Do not use asphalt impregnated filler which will react with joint sealer and stain concrete.

3A-20.3 Water Stops: Extruded rubber, rubber compound or polyvinylchloride. Cross section dumbbell (bulbed), ribbed, or otherwise deformed to prevent movement and with expandable center section. Material shall be resistant to acid, alkali solutions and deterioration. Joints shall be heat sealed. Submit descriptive literature and samples for approval.

3A-20.4 Bonding Agent: "Weldcrete" as manufactured by Larsen Prod. Co., or approved equal.

3A-20.5 Vapor Barriers: Pure polyethylene sheet, 6 mils thick, Commercial Standard CS-238.

3A-20.6 Slip Sheets: Laminated sheets of polyethylene at each face. CS-238, 2 mil minimum thickness, permanently bonded to paper.

3A-20.7 Finishing Materials:

- (a) Form Oil: Colorless mineral oil, Filmo 40 by Humble Oil Co., or approved equal.
- (b) Abrasive Aggregate: For all interior stairs and as called for. Aluminum oxide, natural color, graded to average size #16.
- (c) Form Sealer: Fed. Spec. TT-W-572.
- (d) Sealer (Floor Hardener): Chemical hardener and dustproofing products as manufactured by Preservative Products Co., Hillyard Chemical Co., Master Builders, C. G. Pardee, or approved equal.
- (e) Retardant Form Coating: "Rugasol-F" (Sika Chemical Corporation) or approved equal, applied in accordance with manufacturer's specifications.

- (f) Water Repellent: Water repellent shall conform to Federal Specifications SS-W-00110, ("Silicone Resin Based Colorless Water Repellent"), mineral spirit base with a minimum silicone resin content of 5% by weight.

3A-21 CONCRETE FORM MATERIALS

3A-21.1 General: Use full size sheets of material unless smaller pieces will cover area. Form joints in contact material are permitted only at corners, or where maximum sizes of specified materials are inadequate. Where joints must occur, locations are subject to Government Representative's approval. Strengthen joints to be close fitting in plane to prevent leakage of grout or fines. Construct forms to exact profiles, without visible formings and of select, consistent texture in contact surface. Adequately brace to prevent bulging, deflections, and pilloring between form supports. Unless otherwise noted construct all contact surfaces of minimum 5 ply, 5/8" thick Douglas Fir plywood, concrete form exterior grade, CS-45.

3A-21.2 Tower Formwork

- (a) General: Each lift in the outside curved surface of the tower is of generally different curvature. Individual forms must be built for each lift using new tongue and groove boards and may not be reused. Where curvatures are the same, studs may be reused.
- (b) Lumber:
- (1) General: Tongue and groove board forms shall be kiln dried (moisture content by weight 15 per cent or less). Structural lumber shall not have a moisture content in excess of 19 per cent.
- (2) Species:
- (a) Tongue and groove boards: 1 x 4 T&G Douglas Fir, F. G. Flooring, KD, C and better, conforming to West Coast Lumber Inspection Bureau Rules. Other species may be submitted to the Government Representative for consideration. Such species shall be utilized only if approved in writing by the Government Representative.
- (b) Structural lumber: Douglas Fir or Larch, construction grade or Southern Pine, No. 1.
- (3) Stress Grading: All structural lumber must be straight, structurally sound, with each piece marked by a grading agency approved by the American Lumber Standards Committee of the United States Department of Commerce and stress graded

FAA-STD-006

to the following minimum working stresses without increase for short duration loading:

- (a) Extreme fiber stress in bending - 1450 psi
 - (b) Compression perpendicular to grain - 380 psi
 - (c) Compression parallel to grain - 1200 psi
 - (d) Horizontal Shear - 120 psi
 - (e) Modulus of elasticity - 1,600,000 psi
- (4) Plywood: Minimum CS-45, 5 ply Douglas Fir plywood, concrete form exterior grade, 3/4" thick for wall forms and 5/8" thick elsewhere, laid with face plies parallel to span, i.e.; the strong way. Where forms will be reused, plastic faced (60-60 overlaid) is recommended.
- (5) Boards: Tongue and groove, dressed and center matched 1" x 4" sheathing boards must be used to form the outside curved wall surfaces. Take care not to damage tongues or grooves or to foul grooves so as to interfere with the proper matching of the boards. Use only full length boards and do not splice. Lay boards level, even spaced with a maximum tolerance of plus 1/32" and minus 1/16".
- (6) Nails: Unless otherwise specified, all nails 20d flat head, diamond point common nails or spikes, two nails per joint. Double headed nails are permitted where required for removal. Use zinc coated annular grooved nails for forms receiving more than 3 uses.
- (a) Use zinc coated 6d large flat head, diamond point box nails for attaching 1" x 4" T&G boards to framing. Use 2 nails at the intersection of each board and stud. Use zinc coated 6d common nails for attaching plywood to framing and space nails 12" along studs and end members. Drive nails flush into 1" x 4" boards and avoid dimpling.

3A-21.3 Formwork for Other Concrete Work: The perimeter concrete foundation walls for the Base and Connecting Corridor Buildings which are exposed to view from the finished grade elevations to the wall tops shall be formed from 1"x4" tongue and groove boards conforming to the requirements for the same type of work on the tower shaft. Other forms shall be constructed of wood or metal and be of suitable size to meet the strength requirements to withstand the pressure of freshly placed concrete, etc.

3A-18

70

3A-22 FORM WORK

3A-22.1 General: Forms must conform accurately to shape, line and dimensions of concrete members shown on drawings. Brace or tie forms together to maintain position and shape. Insure safety to workmen and passerby. Keep wood forms wet until removed. Formwork shall conform to the recommendation of ACI 347 unless noted.

- (a) Build watertight and of low moisture content material, and limit bulging between supports to less than 1/360 of span unless otherwise specified. Maintain forms to eliminate formation of joints due to shrinkage. Detail joints with backup strips to maintain adjacent panels in the same plane. Tightly compress butting joints to prevent leakage.
- (b) Reinforce members supporting form work by approved methods of shoring. Frequently check shores during placing operations and until removal. Drive up when settlement occurs; secure when movement is evidenced. Place shores supporting successive stories directly over those below. Provide form watchers whenever concrete is placed. Stop work if any weakness develops and formwork shows undue movement beyond possibility of adjustment.
- (c) Provide sufficient openings in narrow wall forms, and in any forms where access to the interior is not readily available to facilitate cleaning and inspecting immediately prior to placing concrete. Location of openings are subject to approval by the Government's Representative.
- (d) Form materials having direct contact with concrete on the exterior curved surfaces of the tower shaft shall be of new materials. Used or reused materials on these surfaces will not be acceptable. Other forms may be reused only when in satisfactory condition and reuse is approved by the Government's Representative. Assemble so that form removal will not damage concrete. Before reuse repair damaged surfaces and spackle with approved material.

3A-22.2 Inspection of Forms and Reinforcements: Notify the Government's Representative at least 24 hours in advance before concrete is placed. The Government Representative's judgement is final as to the reusability of forms.

3A-22.3 Cleaning and Oiling Forms: Treat with form oil before reinforcement is placed. Wipe off excess oil with rags to leave surface of the forms just oily to the touch. Care must be taken to prevent oil being sprayed on reinforcing steel which will destroy bond.

FAA-STD-006

3A-22.4 Form removal: Determine the time at which forms may be removed without endangering the structure, subject to the following limitations and the Government's Representative's approval:

- (a) Footing Forms: 7 days minimum; continue curing as specified.
- (b) Wall Forms: 7 days minimum; continue curing as specified. If necessary, verify with test cylinders at Contractor's expense.
- (c) Do not strip superstructure slabs and beams until concrete has attained at least 75% of its design strength. Verify by test cylinders at Contractor's expense.

3A-22.5 Reshoring: Immediately after stripping, fully reshore all slabs and beams which are to be used to support shores for upper slabs. Submit method of reshoring for approval by Government's Representative.

3A-22.6 Protect all sharp edges of concrete and in general maintain integrity of design. Loosen complete sections of forms which can be removed without exerting stresses against corners, offsets or reveals. Prying against exposed concrete surfaces with tools of any description is not permitted. Where noted or indicated on the drawing exposed concrete corners shall be chamfered 3/4 inch.

3A-23 FURNISHING AND INSTALLING INSERTS

3A-23.1 Furnish and install anchors, bolts, inserts, metal ties, nailing blocks and other items to be built into the concrete before concrete is placed. All anchor bolts shall be set true to line and grades as indicated on the drawings. Immediately after the pour, the anchor bolts shall be checked.

3A-23.2 All electrical conduit which must be placed on concrete slabs shall be installed after and above the bottom reinforcing, but before the top reinforcing. Where conduit crossovers are necessary, locate so that reinforcing is not displaced from its specified position. Unless otherwise indicated in drawings, no conduit or outlet boxes may be placed in concrete walls. When necessary, submit layout for approval.

3A-24 JOINTS

3A-24.1 Construction Joints: Construction joints are shown on the drawings. Additional joints are permitted only when approved by the Government Representative.

- (a) Before placing concrete at a joint remove all laitance, thoroughly soak old concrete, and slush with 1/2" of neat cement grout. Reinforcing continuous across joint.
- (b) Provide keyways approximately 2" x 4" in all construction joints.

3A-24.2 Control Joints: Where located and detailed on the plans, provide shrinkage control joints.

- (a) Create vertical plane of weakness by vertical notches on each face of the wall or beam, as detailed.

- (b) Continue half of horizontal reinforcing alternately across the joint, and stop half at each side.
- (c) Locate all construction joints at the control joints.

3A-24.3 Expansion and Contraction Joints: As located and detailed on plans.

- (a) Use premoulded filler, as specified herein, full depth of section.
- (b) Install joint sealer in joints specified above and in accordance with Section 7B.
- (c) Metal expansion joints, expansion joint covers and nosings are specified in Section 5C and shall be installed in concrete work as necessary.

3A-24.4 Waterstops: Provide waterstops in all expansion and control joints below grade with all joints heat sealed.

3A-25 PLACING STEEL REINFORCEMENT

3A-25.1 All Reinforcing: Securely tied and supported by chairs, bolsters, etc., per ACI-319. Reinforcing must not be displaced during pouring operation. Dowels for walls, columns, etc., must be wired in place before depositing concrete.

3A-25.2 Clearance Distance: Forms to reinforcement including ties over 3/8" as follows:

- (a) Footings -3" from soil
- (b) Walls: exposed surfaces -2"
- (c) Walls: Interior surfaces -3/4"
- (d) Beams, girders and columns -1-1/2"
- (e) Slabs on forms -3/4"
- (f) Exposed sections -2"
- (g) Tolerances: 3/4 inch for foundation, 1/4 inch all other work

3A-25.3 Splice laps:

- (a) Bars -24 diameters unless otherwise indicated
- (b) Mesh -12"

FAA-STD-006

3A-25.4 Do not cut bars to clear sleeves or slots through slabs or walls. Warb bars around these openings.

3A-25.5 Provide 2 - 4# diagonal bars at each corner of all rectangular openings in slabs or walls.

3A-25.6 All reinforcing steel within limits of one day's pour must be in place, wired, inspected, and approved, before depositing concrete. All reinforcing steel must be placed and wired in sufficient time, as approved by the Contracting Officer, for inspection before depositing concrete.

3A-25.7 For slabs on grade and footing reinforcement, support bars or mesh on precast concrete blocks or plastic asseccories spaced at intervals required by size or reinforcement used to keep reinforcement within minimum height specified above underside of slab or footing. For support of top steel in tower shaft foundation see drawings.

3A-25.8 Extreme care must be exercised in placing reinforcing steel to prevent any marring of interior faces of forms or shifting of forms.

3A-25.9 Tying reinforcing steel with wire to nails in forms or using wood spacers is not permitted. If necessary, cover may be maintained with plastic doughnuts.

3A-26 DEPOSITING CONCRETE

3A-26.1 Preparation: Before placing concrete in the forms, verify that forms have met all requirements specified; that reinforcing steel, sleeves, inserts and all other materials to be embedded are in place and securely tied; that bonding surfaces of any concrete in contact have been properly prepared; and that forms are absolutely clean. All reinforcement shall be free from loose slakey dust and scale, and free from mud, oil and grease. Clean inside form surfaces and maintain free from dried or hardened splatterings or coatings of concrete immediately prior to placing concrete against that part of surface. Keep all chutes, troughs, pipes and other placing equipment clean and free from coatings of hardened concrete after each run. Discharge water used for flushing clear of concrete already in place.

- (a) Force loose wires, nails, dirt and debris to a cleanout with a jet stream of compressed air and collect with large vacuum cleaners. Hose forms thoroughly with water. If placing of concrete does not commence immediately after cleaning, cover openings in forms with tarpaulins.

3A-26.2 Placing: Place concrete on clean, damp, surfaces free from ponded water, ice, frost, mud, debris or objectionable coatings. For exposed concrete sections, special care must be exercised to prevent segregation of concrete and avoid splashing forms or reinforcing with concrete. Any such splashings or accumulations of hardened or partially hardened concrete on forms or reinforcement above general level of the concrete already in place must be removed before work proceeds. Place concrete so that free fall does not exceed 4 feet. Place concrete through canvas or polyvinyl chloride elephant trunks of variable lengths and minimum 6" diameter; or through minimum 2'x2' windows in rear formwork face. Place columns and walls at least 24 hours before slabs and beams resting on them unless otherwise noted.

- (a) Place sufficient number of chutes or trunks in forms to insure concrete being kept level at all times. Use of chutes longer than 10' is prohibited. Provide sufficient illumination in interior of forms so that concrete at places of deposit is visible from deck.
- (b) Deposit concrete as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Carry concreting on at such a rate that concrete is at all times plastic and flows readily into spaces between bars. Lifts of concrete in forms not to exceed heights of 3 feet, and not further than 6 feet from final position. Deposit no concrete that has partially hardened has become contaminated by foreign material, nor rettempered concrete.
- (c) Prevent splattering or dripping of concrete or mortar on finished surfaces below. Station a mechanic continuously on the level below during concrete placing, equipped with a long handled bristle brush and water hose, to remove any drippings or splatterings resulting from operations above.
- (d) No Lifting or Hooking of the steel into position after the concrete is placed shall be permitted for any portion of the work.

3A-26.3 Placing with Vibration: Place concrete with the aid of mechanical vibrating equipment. Vibration equipment: mechanical high frequency type (15,000 VPM) approved by the Government Representative. Apply vibration directly to concrete unless otherwise approved. Intensity of vibration must be sufficient to cause flow or settlement of concrete into place.

- (a) Place vibrator at bottom of form before depositing concrete. Apply vibration at point of deposit and in area of freshly placed concrete, of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures, but not long enough to cause segregation of mix. Space vibration immersion points not further than 18" in any direction. To secure even and dense surfaces, free from aggregate pockets or honeycomb, supplement internal vibration by external vibration with rubber mallets applied continuously to form surfaces during placement of concrete and while it is plastic. Caution must be exercised using vibrators to prevent any injury to the inside face of forms or any movement or misalignment of reinforcement.

3A-26.4 Construction Joints and Stoppages: Placing of concrete must be continuous between construction joints shown on drawings. If for any reason it is necessary to stop placing concrete at places other than those indicated, such places must be at control joints with the approval of the Government's Representative.

FAA-STD-006

- (a) Immediately after concrete placement is completed, clean reinforcement projecting above the concrete. Level surfaces of concrete whenever a run of concrete is stopped.

3A-26.5 Depositing Against Other Concrete: Before depositing new concrete on or against concrete that has hardened, retighten forms and thoroughly clean surfaces of hardened concrete of foreign matter and laitance, then moisten with water. To prevent honeycombing and insure sufficient mortar at juncture of hardened and newly deposited concrete, deposit a layer of cement sand grout (1-2 mix), using identical cement and sand incorporated in architectural concrete mix, against hardened concrete and at all horizontal casting junctions to a thickness of at least 1" on horizontal surfaces, unless otherwise approved. Follow with regular mix concrete.

3A-26.6 Precautions: Keep a sufficient number of spare vibrators accessible at place of depositing concrete to assure adequate vibration in case of breakdown of those in use. If electric power is required for operation of vibration equipment, grounded electrical connections must be available before concreting commences.

3A-27 MIXING AND CONVEYING CONCRETE

3A-27.1 General: Submit details of proposed supplier and concrete mixing plant to Government's Representative for approval. Provide the Government's Representative free access to plant at all times for sampling of materials, or inspection of work. Acceptable temperature limits of concrete: 55° 90° F. In event Contractor elects to batch and mix concrete at site, ASTM C-94 governs.

3A-27.2 Truck Mixed: Concrete may be truck mixed if properly mixed under supervision of Testing Agency at building site and in compliance with ASTM C-94. Color flag trucks to indicate type of concrete being hauled. Mixes, once designed and proportioned must be consistently controlled by ready-mix supplier. Strengths noted are minimum strength acceptable and results of tests competently performed are basis of acceptance. Concrete must be poured into the forms within one hour after water has been introduced to the cement and aggregate mix. Retempered concrete is not permitted.

3A-28 PROTECTION AND CURING

3A-28.1 Protect exposed surfaces of concrete from premature drying. When site temperature exceeds 40° F and is rising, wet cure exposed surfaces of concrete, walls, and spandrels with a continuous stream of water from perforated plastic or rubber hose draped with burlap mats for minimum period of seven days after placing. To facilitate circulation of water, loosen backs of forms one day after placement of concrete. Wet cure slabs seven days with burlap, sand, curing paper, or fog spray. If high early strength cement is used, as permitted herein, the curing time may be reduced to three days. Curing by means of commercial sealing compounds may be used,

for concrete work except exposed architectural concrete. The curing liquid shall be clear and shall conform to Federal Specification TT-C-00800 (Curing Compound, Concrete, for New and Existing Concrete).

3A-28.2 When the temperature is below 40° F or when freezing weather is possible within 24 hours, heat concrete aggregates and mixing water so that temperature of concrete when deposited is above 55° F but less than 80° F. Precautions must be taken to assure concrete temperature of 70° F for at least 24 hours and 50° F for an additional four days, unless climatic conditions make longer periods of controlled concrete temperature desirable. When stripping during cold weather, concrete must not be submitted to thermal shock with maximum temperature drop as specified in "Recommended Practice for Winter Concreting" ACI-604 and ACI-306. Protective measures proposed must be submitted for the Government Representative's approval. Do not mix chemicals or other foreign materials with concrete for purpose of preventing freezing.

3A-28.3 Protect completed concrete from damage by construction operations and during removal of forms, and from freezing winds with additional tarpaulin windbreaks.

3A-28.4 Keep permanent temperature record showing date and outside temperatures. Take thermometer readings at start of work in morning and noon and high-low during night. Record readings obtained to show the effect they may have had during construction.

3A-28.5 Place no concrete during rainstorms. Protect new concrete against damage by rain or injurious action of sun. Keep sufficient coverings on hand for this purpose.

3A-28.6 Take particular care in curing of all finished floor slabs to control shrinkage. Begin curing immediately after finishing.

3A-28.7 Do not pour concrete footings, slabs or mats on frozen soil. Protect against freezing and heaving of subgrade after castings.

3A-29 COLD WEATHER PROTECTION

3A-29.1 Provide and maintain space heaters to provide temporary heat 24 hours per day to protect and cure concrete work when outdoor temperatures at site are below 40° F. Distribute space heaters to provide inside temperature of 55° F. in parts of building where concrete is being placed or being cured. When temporary heat is required, enclose work with tarpaulins, ballooned at top and bottom so that all sections of work will be maintained at 55° F. Enclosure: wind-proof and strong enough to resist weather and wind conditions. Enforce strict fire prevention methods. Take caution to direct heat so that the concrete is not subjected to excessive temperatures or drying out. In place of space heaters for outside form surfaces, vapor proof blanket insulating may be used provided that above concrete temperatures are maintained. Provide adequate and tight moisture barriers for at least 4 days to prevent drying out of concrete. When dry

FAA-STD-006

heat is used, means of maintaining atmospheric moisture shall be provided. All aggregates and mixing water shall be heated to a temperature of at least 70° but not more than 100°F.; the aggregates may be heated by either steam or dry heat. In case of extremely low temperatures, and/or for pouring of thin sections, the GOVERNMENT REPRESENTATIVE may at his discretion, raise the minimum limiting temperature of the fresh concrete in place to 70°F.

3A-29.2 Temporary Heat: Smokeless hot air unit heaters or steam. Salamanders not permitted. Keep all temporary heating equipment properly fueled and attended.

3A-29.3 Whenever there is doubt as to suitability of cold weather conditions, Contractor proceeds with concrete work at his own risk. If the Government's Representative objects to his proceedings, no concrete may be placed.

3A-30 FOOTINGS

3A-30.1 All footings to bear on firm, undisturbed soil as specified in Section 2A.

3A-30.2 Support reinforcing 3" clear of soil on bricks, precast blocks, or plastic chairs.

3A-30.3 Column and wall dowels to be positioned, supported and tied in place before concrete is placed.

3A-30.4 All footing bottoms to be inspected and approved by the Government's Representative, before casting.

3A-31 SUPPORTED SLABS ON FORMS

3A-31.1 Build all forms to required dimensions. Camber as shown on drawing, or specified.

3A-31.2 Lay all reinforcing as shown on approved placing plans. Support bars at specified heights with bolsters, chairs, etc., so that reinforcing will not be moved from the specified position during placing of concrete.

3A-31.3 Lay all conduit in slabs or beams above the bottom bars and below the top bars.

3A-31.4 Place concrete as dry as possible. Vibrate, screed to levels and finish as specified.

3A-32 FLOOR SLABS ON GROUND

3A-32.1 Form depressed ribs under partitions as required, by shaping gravel, or provide permanent side formboards to retain gravel.

3A-26

3A-32.2 Place vapor barriers lapped at least 4" and lay slab of thickness shown on drawings and reinforced as shown. Screed and float level and finish as specified.

3A-33 MISCELLANEOUS CONCRETE: Provide all miscellaneous concrete or cement work as shown on the drawings or specified, including setting anchor bolts and grouting of base, leveling plates, elevator door sills, and access hatches. Use still 1:3 mix except as specified hereafter. Pack solidly. Provisions for grouting under the column base plates and the beam bearing plates in the base and connecting corridor buildings shall be made in the field and the method used shall be approved by the Government Representative. The grouting material shall be a NON-SHRINK ready-to-use product requiring only mixing with water at the job site. It shall be equal to Embeco Pre-Mixed Grout as manufactured by the Master Builders Company to Cleveland, Ohio. The underside of the plate shall be cleaned of all grease and oil-like films; the pertinent concrete surfaces shall be cleaned of all similar contamination and debris. The top of the concrete shall be chipped and roughened and all laitance or poor concrete removed. The concrete shall be water-saturated for a period equivalent to 2 hours, the excess water removed and the non-absorbent end-forms erected. Minimum depth of grout shall be (one) 1 inches and it shall be placed under the plate in such a manner which will avoid air voids. The grout shall be packed and tamped from one to two sides only and shall be sufficiently compacted in order to transfer adequately the column or beam loads to the concrete foundation or beam seat. The shims shall be placed in such a manner that they can be removed after the grout has cured and is capable of transmitting the loads. Cars shall be used in keeping the grout damp during the curing period. The recommendations of the grout manufacturer with respect to mixing, placing, curing and for protecting the exposed surfaces, are to be closely followed.

3A-34 CONCRETE EQUIPMENT PADS: Furnish and install concrete pads for mechanical and electrical equipment of sizes and heights as required to suit each item of equipment. Strength shall be as specified on the drawings and mixture in accordance with Section 3A-18.

3A-35 MANHOLES AND CATCH BASINS: Manholes and catch basins shall be constructed of concrete having a compressive strength of 3000 lbs. per square inch after 28 days. Concrete mixture shall be in accordance with Section 3A-18. Frames and covers shall be given two coats of asphaltum immediately upon arrival on the job site. Unless otherwise shown on drawings, the invert channel shall be smooth and semi-circular in shape conforming to the inside of the adjacent sewer section. Changes in direction of flow shall be made with a smooth curve as large as the size of the manhole will permit. Changes in size and grade of the channel shall be made gradually and evenly. The floor of the manhole outside the channels shall be smooth and shall slope toward the channels not less than 1 inch per foot nor more than 2 inches per foot. In unpaved areas, the top of the manhole covers shall be $\frac{1}{2}$ inch above the finished grade unless otherwise indicated on drawings. Openings for pipe entrances to in-service sewer manholes shall be made by core drilling or by other drilling apparatus approved by the Contracting Officer.

FAA-STD-006

3A-36 CONCRETE ENCASEMENT FOR DUCTS: This concrete shall be of the strength specified on the drawings and the mixture specified in Section 3A-18.

3A-37 PERLITE INSULATION CONCRETE ROOF

3A-37.1 Scope: These paragraphs cover the requirement for the perlite insulating concrete fill for the roof and its mix, placing and finishing. The perlite contractor shall furnish all plant, labor, materials, equipment and supervision for installing and finishing to grade the perlite insulating concrete fill with the required expansion joints and expansion joint material and the light gauge steel reinforcement mesh. The installation shall be in accordance with the recommendations of the Perlite Institute, Inc.

3A-37.2 Materials: The perlite concrete shall be a 1:6 mix with a maximum over dry density of 27 #/cu. ft. Weight tolerance 24 to 28 #/cu. ft. Cement used for the mix shall be Type III Portland cement high early strength in accordance with ASTM C150. The mix shall contain an air entraining agent of the standard solution or material as recommended by the Perlite Institute Inc. The water shall be clear and free from oil, acid, alkali, organic matter, or other deleterious substances. The perlite concrete mix shall be made from expanded perlite aggregate having a loose density of 7½ to 12 pounds per cubic foot and the design of the mix and the mixing procedure shall be based on the recommendations of the Perlite Institute Inc. A one (1) inch expansion joint shall be installed through the thickness of the perlite concrete at the junctures of all walls with the perlite concrete. The expansion joint may be a one (1) inch air space or one (1) inch of expansion joint material equal to sponge synthetic rubber joint filler conforming to Type I of ASTM D1752. The reinforcing mesh shall be light gauge galvanized steel with a minimum of 16 gauge line wires and 19 gauge mesh wires equal to style 2160-2-1619 Keydeck as manufactured by the Keystone Steel and Wire Company of Peoria, Illinois. The physical properties of the perlite concrete shall have in addition the following characteristics:

- (a.) A minimum compressive strength of 125 #/sq. inch at 28 days, oven dry.
- (b.) A wet density of 40½ #/cu. ft. ±2#/cu. ft. when placed.
- (c.) A thermal conductivity K value of 0.54 to 0.70 (BTU/HR/SQ. FT./°F/inch thick) at 28 days.

3A-37.3 Placing and Finishing: Shall be in accordance with the recommendations of the Perlite Institute, Inc. In addition, the following procedure shall be used as a basis for the acceptance of good workmanship. The steel deck shall be cleaned of all surface dust and loose material. Areas of the roof deck which have oil, grease, mud and other adhering and foreign material shall be thoroughly cleaned with mineral spirits. Holes in deck seams, roof openings and weld areas, where the perlite can run out, shall be covered with roof deck tape or sheet metal.

3A-28

- (a) Screeding guides shall be installed and positioned in order to maintain the finished roof slopes as indicated on the drawings. The screeds shall be supported in a manner which will make it possible for them to be removed. The light gauge reinforcing mesh shall be aligned with the 16 ga line wires parallel to the longitudinal centerline of the building (the long dimension of the building). The ends of the mesh shall lap a minimum of six (6) inches and the sides shall lap a minimum of four (4) inches. The mesh shall be cut to fit at the wall coping, and roof openings. The mesh shall be extended into all areas where the perlite will be placed. At areas where the roof is four inches or over in thickness, (bottom of steel deck to top of perlite) the steel mesh shall be supported so that it will be between 1 to 2 inches below the top surface of the perlite. The mesh shall be supported and securely held in the proper position while the concrete is being placed. Supports shall be in accordance with ACI 315. The expansion joint material, when used, shall be installed and supported at the proper elevation in such a manner that it will not move out of alignment during the placing and finishing of the perlite concrete. When no expansion joint material is used, the one (1) inch joint shall be made by using appropriate forming equipment which can be removed after the perlite has cured the required number of days.
- (b) The Contractor shall supply temporary vertical shoring and bracing of the underside of the deck during the placing and curing period of the concrete. The shoring method used shall provide a level surface at the proper elevation and be of sufficient strength to support the loads without visible deflection. The support shall be provided with adjustment methods (shims, etc.) by which adjustments can be made if required during the placing of the concrete. Supports shall be kept in place a minimum of 3 days.
- (c) The perlite concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent segregation or loss of material. The concrete shall be placed from beam and column supports to middle of roof slab, uniformly in all bays at the same time.
- (d) The perlite concrete shall be carefully deposited and screeded in a continuous operation. Rodding, tamping, or vibrating methods shall not be used except at corners or around openings. Excessive consolidating methods, including vibrating, shall be avoided. Steel troweling shall not be used. The finish shall be a smooth wood trowel finish and the finishing time shall be only the time required to finish the surface to the contour as shown on the applicable drawings.
- (e) The perlite concrete shall cure for at least three (3) days and be dry enough when the roofing is applied to develop adhesion with the hot pitch of the roofing material.
- (f) For winter or cold weather construction work, the recommendations of the Perlite Institute, Inc., shall be followed.

FAA-STD-006

3A-38 PATCHING AND CLEANING

3A-38.1 Patching Architectural Concrete: Patch at earliest practical time any exposed architectural concrete, which is not formed as shown on drawings, is out of alignment or level, or shows defective surfaces resulting from improper casting techniques or injury during the course of construction. The Government Representative's judgement is final as to whether such patching restores quality and appearance or whether removal is required.

- (a) After removing forms, inspect concrete surfaces and patch voids, stone pockets, or defective areas permitted by the Government Representative to be patched, immediately in weather over 40°F. and rising. Sufficient cement finishers are to be available to complete required patching operations the same day forms are stripped. Provisions specified including "Protection and Curing" and "Cold Weather Protection" apply to patching exposed architectural concrete surfaces.
- (b) Wet area to be patched and space 6 inches wide entirely surrounding it to prevent absorption of water from patching mortar.
- (c) Grout for Patching: Approximately equal parts Portland cement and sand using same cement and sand incorporated in architectural concrete mix except to obtain proper color, it may be necessary to add white cement and sand. Add sufficient water to produce a bruahing consistency. Brush grout into surface, float surface scouring it vigourously, and finish with light steel troweling. Remove all excess grout from surface by bagging immediately.
- (d) Mortar: Brush grout into surface and follow with patching mortar. Use normal architectural concrete mix of same sand and cement but with smallest sized coarse aggregate available. To obtain matching color of adjoining concrete surfaces, it may be necessary to supplement mix with white cement and sand. Add minimum amount of mixing water which is as little as consistent with requirements of handling and placing. Thoroughly compact in place and screed off to leave patch slightly higher than surrounding surface. Leave undisturbed for a period of 1/2 to 2 hours permitting initial shrinkage before final finish. Finish to match adjoining surfaces. Final finish obtained by striking off surface with metal straight edge spanning patch and held parallel to direction of form marks. Remove all excess material from surface by bagging immediately.

3A-30

82-

- (e) Tie Holes: Use tool that packs tie holes solid with patching mortar above after first thoroughly washing with a detergent solution. Strike off any excess mortar flush with wall with a straight edge spanning the hole and recess circular patch 1/4" from face of concrete.

3A-38.2 Patching for Other Concrete Work: Defective concrete, honey combed portions, voids left by removal of tie rods, ridges and local bulging on all concrete surfaces permanently exposed to view, shall be repaired immediately after removal of forms unless otherwise authorized or directed. Voids left by the removal of tie rods shall be reamed and completely filled with dry-patching mortar. Defective or honey combed portions of concrete shall be repaired by cutting out the unsatisfactory material and placing new concrete which shall be secured with keys, dovetails or anchors. Excessive rubbing of formed surfaces will not be permitted.

3A-38.3 Grinding: Remove nibs, projections and other protuberances, by use of an approved hand stone, on all concrete, exterior and interior, exposed to view.

3A-38.4 Cleaning: The Government Representative may require, at no addition to the contract price, remedial action to remove blemishes, rust stains or discolorations from the exposed concrete. Remedial action consists of any or all of the following:

- (a) A clean down with mild solution of detergent and water applied by scrubbing vigorously with soft bristle, then flushing with water. Remove rust stains by applying a paste of oxalic acid, allow to stand for at least 3 hours and remove by rubbing with approved hone.
- (b) A clean down with solution of muriatic acid containing not less than 5% nor more than 10% acid by volume, applied to surface previously saturated with clean water by scrubbing vigorously with stiff bristle brushes. Immediately after cleaning drench surfaces with clean water to remove acid. Protect metal and other materials that would be damaged by acid.
- (c) Remove deep stains, incrustations of mortar on surfaces by an approved hone or grinding wheel.
- (d) Except for rust stains, undertake no cleaning operations until superstructure is entirely completed. Cleaning portions of building as work progresses is not permitted.

FAA-STD-006

3A-39 CONCRETE FINISHES

3A-39.1 Broom: For finishes designated ceramic tile in the drawings: finish, screed, and wood float to proper elevation, generally 1" below nominal floor line. Broom surface when partially set for bonding to subsequent finish application.

3A-39.2 Monolithic: Surfaces receiving resilient flooring or designated as "concrete": float with mechanical or wood float and trowel smooth with steel trowel. After concrete has set to proper degree of hardness, trowel to produce smooth plane surface free of ridges. Dry materials not permitted. Note: Prepare surfaces to receive metallic waterproof as hereinafter specified. Interior equipment pads shall be finished as specified above.

3A-39.3 Other Concrete Finishes: Exterior equipment pads, tops of manholes and catch basins, and exterior door steps shall receive a broom finish. All other surfaces, not otherwise specified, shall receive a wood trowel finish.

3A-39.4 Nonslip: 1/4 lb. of nonslip material dry mixed with 1/8 lb. of Portland cement per square foot of surface. Apply material as dry shake, floated and troweled into surface of concrete while plastic.

3A-39.5 Sealed: Interior concrete floors not receiving other flooring as finish, shall be treated. Concrete shall be thoroughly cured, cleaned, and dried prior to application. Solution shall contain not less than 2 pounds of magnesium fluosilicate and/or zinc fluosilicate crystalline salts per gallon of water. Material shall be delivered ready for use in original sealed containers bearing manufacturer's name and registered trademark. Solution shall be applied using three coats, allowing at least 24 hours between coats. Apply each coat at rate of one gallon per 100 square feet of surface. After final coat is applied and before completely dried, surplus material shall be removed from the surface by scrubbing and mopping with water, leaving surface clean and without discoloration. Dust preventitive solution shall not be permitted to puddle on the surface.

3A-39.6 Protection: Protect all cement floors, treads, and platforms against all mortar or plaster droppings, oil, grease, or other materials which will stain or soil cement finish. Maintain protection until work above is complete. Remove protection when danger to work does not prevail.

3A-39.7 Exposed Concrete: Apply to all exposed cast-in-place concrete, not board formed or sand blasted, where concrete is poorly formed, patched or shows excessive voids at the surface. Mix 1 part Portland cement and 1-1/2 parts fine sand with sufficient water to produce grout having consistency of thick paint. Use white Portland cement for part of cement in grout, to give color desired. Wet surface of concrete sufficiently to prevent absorption of water from grout and apply with a trowel or brush completely filling air bubbles and holes. Immediately after applying grout, float surface with cork or other suitable float, scouring it vigorously. While grout is still plastic, finish with sponge rubber float removing all excess grout

3A-32

84

Finish when grout will not pull from holes or depressions. Allow surfaces to dry until it takes on powdery appearance, then rub vigorously with dry burlap to completely remove dried grout. Leave no visible film or grout remaining after rubbing. Complete cleaning operation for any area the day it is started up to but not past pour and control joints. Leave no grout on wall over night. After grout cleaning, if slightly dark spots or streaks remain, wipe off lightly with a fine abrasive hone without using water. Do not rub with hone sufficiently to change texture of concrete. Adjacent surfaces may require this finish for uniformity.

3A-39.8 Sandblasted: Sandblast all exterior exposed architectural concrete on the tower shaft, base and connecting corridor buildings. Operate sand-blasting equipment at minimum pressure, approximately 60 to 80 lbs. and use smallest sized silica sand abrasive available, size 00 Ottawa sand. Amount of sandblasting is minimum required to remove skin and surface blemishes but not sufficient to damage sharp arrises. Do not commence sandblasting to the Government Representative's approval. Proceed from top of work down and complete lift before proceeding on other sections. After a section has been sandblasted, wash with water or use compressed air to remove dust and abrasive from surface.

- (a) After completion of work, thoroughly clean surfaces of abrasives and waste materials. Protect work which may be damaged by these operations in approved manner. Employ templates to prevent etching of glass or surfaces not intended to be sandblasted.

3A-39.9 Water Repellent: Apply water repellent in accordance with manufacturer's instructions to all exposed cast-in-place concrete surfaces, whether in the interior or exterior of the structure, but not to any horizontal wear surfaces such as treads, etc. Before application demonstrate by samples that water repellent will not stain or change color of exposed concrete.

- (a) Prior to applying water repellent, test concrete surfaces with an approved type meter to determine moisture content. Do not apply to concrete having moisture content in excess of manufacturer's recommended maximum percentage. Allow additional time for drying out.
- (b) When concrete surfaces are dry enough, and after sandblasting has been completed, spray the water-repellent in accordance with manufacturer's directions using approved equipment. Protect adjacent work during spraying and remove any spray and clean areas accidentally sprayed within 1 hour.

FAA-STD-006

- (c) Apply water repellent to all architectural (exposed on the exterior of base and connecting corridor buildings and tower shaft interior and exterior) concrete except floors and stair surfaces treated with sealer.

3A-39.10 Applied Cement Finish:

- (a) Base slab shall be not less than 1" below finish floor level. Before concrete has hardened remove all debris and laitance from surface by wire brooming leaving coarse aggregate slightly exposed. Roughen hardened surfaces by shipping, then clean. Keep base slab wet and just prior to placing topping thoroughly clean base slab by scrubbing; remove excess water. Broom a thin coat of neat cement grout over entire surface ahead of placing topping. Dusting will not be permitted.
- (b) Finish mix shall consist of 1 part Portland cement, 1 part fine aggregate and 2 parts coarse aggregate graded from 3/8" to No. 8, by volume. Mix in a mechanical batch mixer, for not less than 3 minutes after all materials have been included, using not more than 4 gallons of water for each bag of cement when floating is done by machine and 5 gallons for each bag of cement when floating is done by hand.
- (c) After screeding to establish finish lines and levels, compact and then float with wood floats or power floating machines. Floating shall be followed by steel troweling after finish has sufficiently hardened to prevent excess fine material from being worked to the surface, to obtain a smooth surface free from defects and blemishes.
- (d) After topping has set to ring the trowel, surface shall receive a second steel troweling to a burnished finish.

3A-40 SURFACES TO RECEIVE METALLIC WATERPROOFING

3A-41.1 Apply to forms of vertical surfaces, a compound to retard setting of surface concrete to a depth of at least 1/16-inch. Upon removal of forms surfaces shall be treated to expose the aggregate, to provide a granular texture. Retarded shall not have an adverse effect on strength of concrete and shall be applied in accordance with manufacturer's directions.

3A-40.2 Concrete slabs shall be prepared by removal of laitance and scum, leaving surface clean and rough. If final set of concrete has occurred, surface shall be cleaned and roughed by mechanical scouring and chipping. Prepared surfaces shall be uniform and allow one inch for metallic waterproofing. Spaces where treatment is to be applied shall be cleared of all stored material, equipment or other obstructions before starting.

3A-40.3 Continuous grooves shall be formed in construction joints and intersections of vertical and horizontal surfaces by inserting strips to form recesses not less than 1 inch deep by 3/4- inch wide.

3A-40.4 Form ties shall be removed, excess concrete and loose materials ground flush and removed, honeycomb, aggregate pockets and voids cut back or undercut to solid concrete and then treated.

3A-41 BARRICADES AND PROTECTION: Furnish barricades and protection for safety of finished concrete work, particularly exposed architectural concrete. If material is passed from outside of building, or if material lift is installed, location of openings must be approved by Government Representative. Protect adjacent concrete work.

3A-42 PUMPING: During concreting operations, provide and maintain all required pumps, suction, and discharge lines. Run in sufficient numbers and capacity to keep all excavated areas free from water when concrete. Maintain equipment in perfect working order.

3A-43 POROUS FILL

3A-43.1 Slabs on ground shall be installed over a well graded porous fill of gravel or broken stone, of thickness indicated thoroughly compacted.

3A-43.2 After the porous fill under slabs on ground is thoroughly compacted and leveled, furnish and install a layer of polyethylene vapor barrier between the porous fill and the concrete slabs, applied in the widest practicable width and with all joints lapped and sealed.

3A-44 CONCRETE CURBS

3A-44.1 Form concrete curbs of size and shapes indicated on drawings constructed of air-entrained concrete of strength indicated on drawings. Reinforce curbs where indicated on drawings.

3A-44.2 Compact material underlying curbs to provide an even bearing subgrade. Remove unsuitable material and replace with acceptable material properly compacted.

3A-44.3 Use forms of metal or surfaced lumber to provide clean, smooth surfaces.

3A-44.4 Finish curbs by steel troweling and then rub exposed surfaces to a uniform, smooth, even surface using carborundum stone. Plastering with mortar to build up or to finish curbs will not be permitted.

3A-44.5 Provide expansion joints where indicated. Provide non-asphaltic premolded filler for the full height and thickness of curb.

3A-44.6 Protect curbs until completion of contract. Replace any damaged curb at no additional cost to the Government.

FAA-STD-006

3A-44.7 Construct sample curb, showing finish and expansion joint and obtain Contracting Officer's approval before proceeding with casting of curbs. Curbs which do not match approved sample curb shall be removed and replaced.

3A-44.8 Provide drop curbs where indicated on drawings.

3A-45 CONCRETE SIDEWALKS

3A-45.1 Bring subgrade to required level below and parallel to finished grade. Remove any unsuitable material in subgrade and replace with suitable fill. Compact subgrade.

3A-45.2 Over subgrade install compacted thickness of porous fill to provide a smooth, true to grade, even bearing surface.

3A-45.3 Over porous fill install a layer of polyethylene kraft paper or dampen the surfaces of the porous fill immediately before placing the concrete. The porous fill shall be dampened by water sufficient only to be absorbed by the porous fill, but shall not be muddy or frozen at time of pouring and shall be maintained in a satisfactory condition and properly drained until the concrete is installed.

3A-45.4 Forms shall be of steel or surfaced lumber with suitable dividing plates of thickness to provide the width of joint indicated. Forms and dividing plates shall be set with their tops at the exact finished grade. Dividing plates shall be located to form the score joint pattern indicated on drawings. Forms shall remain in place until the concrete has thoroughly hardened, but the dividing plates shall be removed promptly after the concrete is of sufficient hardness to prevent the slabs from flowing together. The Contractor has the option of sawing the score joints to the width and depth indicated in lieu of using metal dividing plates.

3A-45.5 Provide expansion joints where indicated. Provide non-asphaltic premolded joint filler, extending to the bottom of the concrete.

3A-45.6 Concrete for sidewalks shall be air-entrained concrete of strength indicated on drawings, poured in one course, uniformly thick and separated at expansion joints with metal dividing plates. Tamp and screed concrete with not less than 2 screeding passes to bring up sufficient mortar to the surface for proper finishing. The Contractor shall handle concrete with care so as not to segregate the materials or disturb the location or elevations of the forms.

3A-45.7 Finish the top surface to produce an acceptable wood float finish. Finishing operations shall follow closely behind pouring operations. Where sidewalks are cracked or damaged, remove the entire panel wherein damage has occurred and install a new panel of sidewalk. No patching of sidewalks will be permitted. Submit sample of sidewalk finish for Contracting Officer's approval.

3A-36

3A-45.8 No pedestrian traffic is to be allowed on sidewalks for 5 days after construction.

3A-46 FILL FOR METAL PAN STAIR TREADS AND PLATFORMS

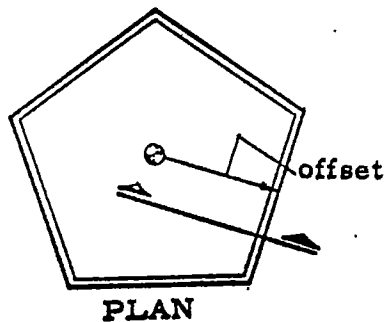
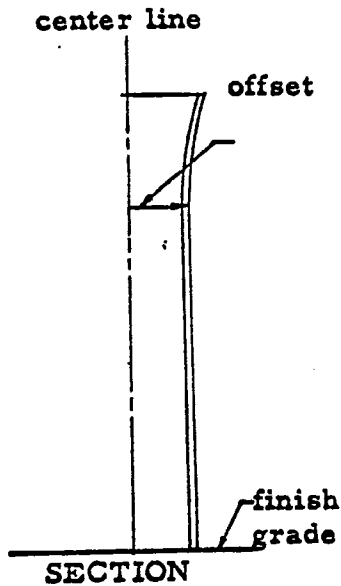
3A-46.1 Fill shall be composed of one (1) part Portland cement, two (2) parts of sand and one and one-half (1-1/2) parts of crushed stone or gravel passing a 1/4 inch sieve and being retained on a 1/8 inch sieve, measured by volume and with only sufficient water added thereto to produce a mixture of the driest consistency for proper finishing. After striking off the fill to the proper levels, the fill shall then be thoroughly compacted and finished by hand floating. After the fill has hardened sufficiently to prevent excess fine material from working to the surface, the treads and platforms shall be brought to a smooth finish, free from defects and blemishes, by additional troweling with a steel trowel.

3A-46.2 The treads and platforms of cement or concrete steps and stairs and cement floors where so indicated, shall be made non-slip by embedding in the surface an abrasive aggregate of aluminum oxide applied uniformly at the rate herein before specified.

3A-46.3 The fill for the pans shall be reinforced with a light wire mesh. The light wire mesh shall extend over the entire area of each tread and platform and shall be properly supported 1/2 inch above the bottom of the pans.

FAA-STD-006

TOWER H-1 (60'-Nominal) EXTERIOR CURVE OFFSET TABLE
 El. 100'-0" = 0'-0"



	Height	Offset at face from tower center line
	0'- 0"	8'- 5 3/4"
	3'- 9"	- 5 5/8"
C	7'- 6"	8'- 5 9/16"
	11'- 3"	- 5 9/16"
C	15'- 0"	8'- 5 5/8"
	18'- 9"	- 5 11/16"
C	22'- 6"	8'- 5 3/4"
	25'- 0"	- 5 13/16"
	26'- 3"	- 5 7/8"
	27'- 6"	- 5 7/8"
C	30'- 0"	8'- 6 1/16"
	32'- 6"	- 6 1/4"
	35'- 0"	- 6 1/2"
C	37'- 6"	8'- 6 7/8"
	38'- 4"	- 7"
	39'- 2"	- 7 1/8"
	40'- 0"	- 7 1/4"
	40'-10"	- 7 3/8"
	41'- 8"	- 7 9/16"
	42'- 6"	- 7 3/4"
	43'- 4"	- 7 15/16"
	44'- 2"	- 8 1/8"
C	45'- 2"	8'- 8 1/2"
	46'- 0"	- 8 3/4"
	46'-10"	- 9 1/16"
	47'- 8"	- 9 3/8"
	48'- 6"	- 9 13/16"
	49'- 4"	-10 1/4"
	50'- 2"	-10 3/4"
	51'- 0"	-11 1/4"
	51'-10"	8'-11 7/8"
C	52'-11"	9'- 0 11/16"
	53'- 4"	- 1 1/16"
	53'- 9"	- 1 1/2"

3A-38

...continued: (H-1)

	54'- 2"	- 1 7/8"
	54'- 7"	- 2 3/8"
	55'- 0"	- 2 13/16"
	55'- 5"	- 3 3/8"
	55'- 10"	- 4"
	56'- 3"	- 4 9/16"
	56'- 8"	- 5 1/4"
	57'- 1"	- 6"
	57'- 6"	- 6 3/4"
	57'- 11"	- 7 9/16"
	58'- 4"	- 8 7/16"
	58'- 9"	- 9 3/8"
	59'- 2"	- 10 3/8"
	59'- 7"	9'- 11 7/16"
	60'- 0"	10'- 0 9/16"
	60'- 5"	- 1 3/4"
Top of conc.	60'- 9"	- 2 3/4"
Fin. flr cab	61'- 10"	10'- 6 1/4"

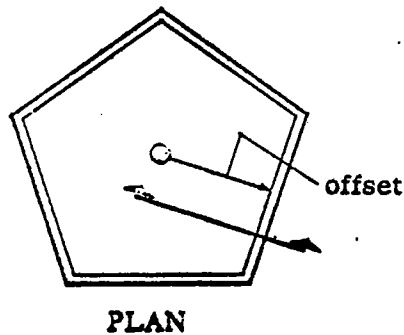
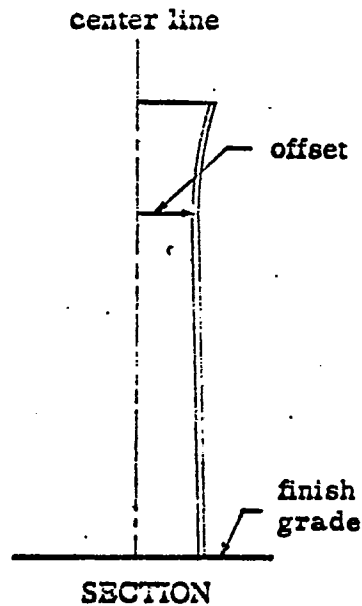
C = CONSTRUCTION JOINT

3A-39

91

FAA-STD-006

TOWER H-2 (75'-Nominal) EXTERIOR CURVE OFFSET TABLE
 EL. 100' - 0" = 0' - 0"



Height	Offset at face from tower center line
0' - 0"	8' - 6 7/8"
2' - 6"	- 6 9/16"+
5' - 0"	- 6 3/8"
C 7' - 6"	8' - 6 3/16"
10' - 0"	- 6"+
12' - 6"	- 5 7/8"+
C 15' - 0"	8' - 5 3/4"+
18' - 9"	- 5 5/8"+
C 22' - 6"	8' - 5 9/16"
26' - 3"	- 5 9/16"+
C 30' - 0"	8' - 5 5/8"
33' - 9"	- 5 11/16"
C 37' - 6"	8' - 5 3/4"
40' - 0"	- 5 13/16"
41' - 3"	- 5 7/8"
42' - 6"	- 5 7/8"+
C 45' - 0"	- 6 1/16"
47' - 6"	- 6 1/4"
50' - 0"	- 6 1/2"
C 52' - 6"	8' - 6 7/8"
53' - 4"	- 7"
54' - 2"	- 7 1/8"
55' - 0"	- 7 1/4"
55' - 10"	- 7 3/8"+
56' - 8"	- 7 9/16"
57' - 6"	- 7 3/4"
58' - 4"	- 7 15/16"
59' - 2"	- 8 1/8"+
C 60' - 2"	8' - 8 1/2"
61' - 0"	- 8 3/4"
61' - 10"	- 9 1/16"
62' - 8"	- 9 3/8"+
63' - 6"	- 9 13/16"+
64' - 4"	- 10 1/4"
65' - 2"	- 10 3/4"

3A-40

92

Continued: H-2

Top of Conc.
Fin. Floor Cab

C - CONSTRUCTION JOINT

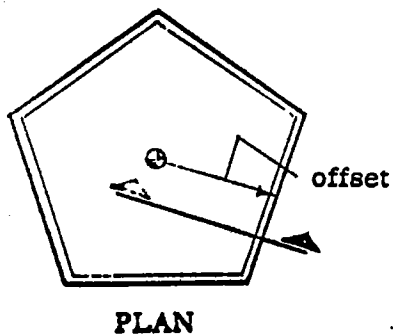
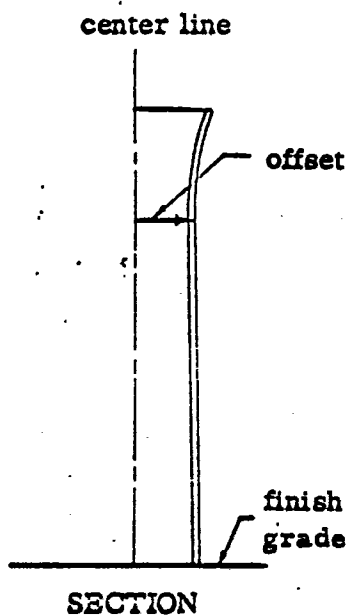
	66'- 0"	-11 1/4" +
	66'-10"	8' -11 7/8"
C	67'-11"	9' - 0 11/16" +
	68'- 4"	- 1 1/16" +
	68'- 9"	- 1 1/2"
	69'- 2"	- 1 7/8" +
	69'- 7"	- 2 3/8"
	70'- 0"	- 2 13/16" +
	70'- 5"	- 3 3/8"
	70'-10"	- 4"
	71'- 3"	- 4 9/16" +
	71'- 8"	- 5 1/4" +
	72'- 1"	- 6"
	72'- 6"	- 6 3/4" +
	72'-11"	- 7 9/16" +
	73'- 4"	- 8 7/16" +
	73'- 9"	- 9 3/8"
	74'- 2"	-10 3/8" +
	74'- 7"	9' -11 7/16" +
	75'- 0"	10' - 0 9/16" +
	75'- 5"	- 1 3/4" +
	75'- 9"	- 2 3/4"
	76'-10"	10' - 6 1/4"

3A-41

93

FAA-STD-006

TOWER H-3 (90'-Nominal) EXTERIOR CURVE OFFSET TABLE
 El. 100' - 0" 0' - 0"



Height	Offset at face from tower center line
0' - 0"	8' - 9 9/16"
0' - 10"	- 9 5/16" +
1' - 8"	- 9 1/8"
2' - 6"	- 8 7/8" +
3' - 4"	- 8 3/4"
4' - 2"	- 8 9/16"
5' - 0"	- 8 3/8" +
5' - 10"	- 8 1/4"
6' - 8"	- 8 1/8"
C 7' - 6"	8' - 8"
9' - 2"	- 7 11/16" +
10' - 10"	- 7 7/16"
12' - 6"	- 7 3/16"
14' - 2"	- 6 15/16" +
C 15' - 0"	8' - 6 7/8"
17' - 6"	- 6 9/16" +
20' - 0"	- 6 3/8"
C 22' - 6"	8' - 6 3/16"
25' - 0"	- 6" +
27' - 6"	- 5 7/8" +
C 30' - 0"	8' - 5 3/4" +
33' - 9"	- 5 5/8" +
C 37' - 6"	8' - 5 9/16"
41' - 3"	- 5 9/16" +
C 45' - 0"	8' - 5 5/8"
48' - 9"	- 5 11/16"
C 52' - 6"	- 5 3/4"
55' - 0"	- 5 13/16"
56' - 3"	- 5 7/8"
57' - 6"	- 5 7/8" +
C 60' - 0"	8' - 6 1/16"
62' - 6"	- 6 1/4"
65' - 0"	- 6 1/2"
C 67' - 6"	8' - 6 7/8"
68' - 4"	- 7"
69' - 2"	- 7 1/8"

3A-42

Continued: H-3

	70'- 0"	- 7 1/4"
	70'-10"	- 7 3/8" +
	71'- 8"	- 7 9/16"
	72'- 6"	- 7 3/4"
	73'- 4"	- 7 15/16"
	74'- 2"	- 8 1/8" +
C	75'- 2"	8' - 8 1/2"
	76'- 0"	- 8 3/4"
	76'-10"	- 9 1/16"
	77'- 8"	- 9 3/8" +
	78'- 6"	- 9 13/16" +
	79'- 4"	- 10 1/4"
	80'- 2"	- 10 3/4"
	81'- 0"	- 11 1/4" +
	81'-10"	8' - 11 7/8"
C	82'-11"	9' - 0 11/16" +
	83'- 4"	- 1 1/16" +
	83'- 9"	- 1 1/2"
	84'- 2"	- 1 7/8" +
	84'- 7"	- 2 3/8"
	85'- 0"	- 2 13/16" +
	85'- 5"	- 3 3/8"
	85'-10"	- 4"
	86'- 3"	- 4 9/16" +
	86'- 8"	- 5 1/4" +
	87'- 1"	- 6"
	87'- 6"	- 6 3/4" +
	87'-11"	- 7 9/16" +
	88'- 4"	- 8 7/16" +
	88'- 9"	- 9 3/8"
	89'- 2"	- 10 3/8" +
	89'- 7"	9' - 11 7/16"
	90'- 0"	10' - 0 9/16" +
	90'- 5"	- 1 3/4" +
Top of conc.	90'- 9"	- 2 3/4"
Fin. Floor cab	91'-10"	10' - 6 1/4"

C - CONSTRUCTION JOINT

3A-43
***95
96-B/K

DIVISION 4SECTION AMASONRY

4A-01 SCOPE: This specification covers the requirements for masonry and its installation.

4A-02 GENERAL: For location and extent of masonry, see drawings.

4A-03 MATERIALS: Material shall be as specified hereinafter. Material not definitely specified shall be of good commercial quality and suitable for the purpose intended.

4A-03.1 Face Brick: Brick shall be modular sizes, first quality, straight, true, uniform in shape and size and free from checks. Material shall be hard burned shale face brick, manufactured by the extruded wire cut method, conforming to ASTM C216, Type FBS, Grade SW. Bricks shall be nominal 3 3/4 inches x 2 1/4 inches x 8 inches. Color and texture shall be uniform and in accordance with the drawings.

4A-03.2 Concrete Block: Concrete block shall consist of hollow masonry units conforming to the requirements of ASTM Designation C90 - Grade A. Hollow units are (for the purpose of this specification) defined as blocks which have more than 25% voids in every horizontal cross section. When necessary to use solid load-bearing units, they shall conform to Grade A of ASTM C145. The units shall have a maximum linear shrinkage of not more than 0.06 percent when tested in accordance with ASTM C426 and a maximum linear shrinkage of 0.08 percent from saturated to oven dry conditions when tested as in accordance with this specification. Blocks shall be nominal 7 5/8 inches x 15 5/8 inches, thicknesses as shown on drawings, and such special sizes, shapes and units as may be required.

4A-03.3 Glazed Masonry Units: Units shall conform to requirements of Concrete Block. Exposed surfaces shall be covered at point of manufacture with a thermo-setting resinous compound containing at least 75% graded silica sand cast on block by an external heat-polymerizing process. The glazing facing shall return over the ends and edges of block forming a lip not less than 1/16 inch thick. The glazed surface shall conform to ASTM C126.

4A-03.4 Mortar: Mortar shall conform to the requirements for Mortar Type M of Specifications for Mortar for Unit Masonry ASTM C270. It should be noted that under ASTM C270 mortar is not required to meet both the property and the proportion specification. The ASTM property specification test must be prepared in the laboratory. The minimum compressive strength of the mortar as determined by the field compressive test specimens shall not be less than 2500 psi at 28 days. Mortar shall not be used as grout.

FAA-STD-006

4A-03.4.1 Colored Mortar: Mix mortar with mortar color to produce a uniform warm beige color throughout, darker than the color of the face brick. Make trial batches of mortar, allow to dry, and obtain Contracting Officer's approval before using. Submit record of the approved color mix to the Contracting Officer.

4A-03.5 Grout: Fine grout and coarse grout for embedding reinforcing bars in concrete masonry or for filling cells therein for structural purposes shall conform to fine and coarse grout type of ASTM C476. The grout shall have a 28 day compressive strength of 2500 #/sq inch.

4A-03.5.1 Grout for the embedding of architectural chattels shall be composed (by volume) of one part portland cement, three parts sand and two parts pea gravel, to which may be added not more than one-tenth part lime putty, except that; in grout spaces having a minimum horizontal dimension less than 4 inches, the pea gravel shall be omitted. The grout shall contain enough water to flow freely without segregation of the aggregate. Grout shall have a 28 day compressive strength of 2000 #/Sq. In. Mortar shall not be used as grout.

4A-03.5.2 Aggregates for grout shall meet the requirements of Specifications for Aggregates for Masonry Grout ASTM Designation C404.

4A-03.6 Reinforcing steel bars shall be new intermediate grade conforming to ASTM designation A15 and shall be deformed in accordance with ASTM Designation A305.

4A-03.6.1 Horizontal wall reinforcement shall be fabricated from zinc-coated cold-drawn 3/16" Dia. (#9) steel wire conforming to ASTM A82 and shall be made for use with 12 inch thick composite masonry walls or 12 inch block walls. The configuration shall be equal to No. 12 DUR-O-WAL TRIROD for composite wall and No. 12 DUR-O-WAL for block wall as manufactured by the Dur-O-Wall National Inc., Cedar Rapids, Iowa.

4A-03.6.2 Special corner and intersection type assemblies shall conform to the above requirements. Center to center spacing of the outer longitudinal wires shall be eleven (11) inches.

4A-04 CONSTRUCTION PRACTICES: Every part of the work shall be executed in the best workmanlike manner in accordance with accepted good practice of the trade and in full compliance with this specification. All masonry work shall be plumb, level, straight and true to dimensions shown on the plans. The work shall start, where feasible, at a least important corner or wall. All pattern work, bonds or special details and reinforcement indicated on the drawings shall be accurately and uniformly executed.

4A-04.1 Supervision and Inspection

4A-2

4A-04.1.1 The Government Representative shall have the right to order whatever certification or tests of materials provided for by this specification or by the ASTM specification under which the material is furnished, which he deems necessary or advisable.

4A-04.1.2 Where specimens are taken by the Government Representative, storage, curing and protection thereof shall be afforded by the Contractor at his expense. The furnishing of cylinder molds for field compressive test specimens of mortar, the delivery of the cylinders to the laboratory and the making of the compression tests of field test specimens will be at the expense of the Federal Aviation Agency. The Contractor at his own expense, shall furnish the Government Representative the necessary material for making the field compressive test specimens for grout. The delivery of the grout specimens to the laboratory and the making of the compression tests of grout specimens will be at the expense of the Federal Aviation Agency.

4A-04.1.3 If the average strength of the laboratory cured specimens falls below the minimum allowable compressive stress, or if there is any other reason to question the quality of the mortar or grout the Government Representative may order such load tests of the completed structure (or portions of the structure) he may deem necessary. If such tests show evident failure, excessive deflection, or lack of recovery of deflection when loads are removed, the contractor will be required (at his own expense) to make such changes or modifications needed to make the structure adequate for its rated capacity.

4A-04.2 Masonry Units

4A-04.2.1 Top of Concrete Foundation Walls: Horizontal concrete surfaces that are to receive masonry shall be clean and damp, with the aggregate of the concrete exposed to assure a good bond between mortar and grout and concrete. All laitance shall be removed as roughness in itself is not indicative of good bond. The first course shall be laid on the concrete, taking care that the mortar bed does not extend into any cells that are to be grouted. Then all cells in this course that are to receive grout shall be grouted to a point $1\frac{1}{2}$ inches below the top of the course. The minimum time between placing foundation and starting masonry shall be when the concrete has attained reasonable strength, but not less than 48 hours to allow for strength and initial shrinkage of the concrete.

4A-04.2.2 Storing and Handling: Masonry units shall be stored in a dry place and off the ground, so that at time of laying, all units shall be sound and clean.

4A-04.2.3 Wetting: Concrete masonry units shall not be wetted before laying, except in hot dry weather when the bearing surfaces may be slightly moistened immediately before laying. In hot dry weather the bearing surfaces of the concrete masonry shall be slightly moistened immediately before laying. All brick having an absorption rate in excess of 0.025 oz per square inch per minute shall be wetted sufficiently so that the rate of absorption when laid does not exceed this amount. The absorption rate shall be determined in accordance with ASTM C67.

FAA-STD-006

4A-04.2.4 Cutting Units: Where masonry unit cutting is necessary, all cuts shall be neat and accurate. Except for minor cuts, units should be cut with a mechanical device.

4A-04.3 Shoring and Scaffolding

4A-04.3.1 Vertical Loads During Construction: All horizontal load bearing members shall be adequately shored. In no case shall shores and forms be removed until it is certain that the masonry has hardened sufficiently to carry its own weight and all other loads that may be placed on it during the construction. The results of suitable control tests may be used as evidence that the masonry has attained such sufficient strength. In addition to the foregoing strength requirement the following arbitrary elapsed times are recommended. Vertical side forms where used for sides of beams, lintels, etc., shall not be removed for 10 days, and then only if the grout has hardened sufficiently to prevent injury. At least 48 hours shall elapse after building masonry columns or walls before constructing the roof.

4A-04.3.2 Lateral Loads During Construction: Partially completed walls and completed walls shall be braced against high winds and heavy rains during the construction period. The wall braces shall be placed at approximately 20 feet intervals and left in place until after the erection of the roof framing, steel deck and perlite concrete. The use of temporary lateral bracing at other positions along the wall as required is left to the discretion of the Contractor and it shall be his responsibility to protect the work during the progress of construction to the completion of the roof.

4A-04.4 Mortar: At time of using, mortar on the boards shall have a slump of approximately 2 3/4 inches. This slump shall be determined by the Field Slump Test for mortars. The exact amount of slump shall be established at the start of construction and maintained throughout the progress of the work.

4A-04.4.1 Admixtures: No admixtures shall be incorporated into the mortar.

4A-04.4.2 Placement: For bed joints the mortar shall be spread in length only to the extent that it will still be plastic when the last unit is placed upon it, thus assuring adequate bond between the mortar and the upper masonry unit.

4A-04.4.3 Re-Tempering: Re-tempering on mortar boards should be done only by adding water within a basis formed with the mortar and the mortar re-worked into the water. Harsh, non-plastic mortar should not be re-tempered nor used. Any mortar which is unused after one hour of the initial mixing shall be removed from the work. Mortar shall be re-tempered with water as required to maintain high plasticity.

4A-04.5 Grout

4A-04.5.1 Mixing: All parts shall be determined by accurate volume measurement at the time of placing in the mixer, and shall be mixed in a mechanical mortar mixer. Care shall be used in accurately measuring all the parts. The mix shall preferably not be less than a multiple of sacks of cement. When less than one sack of cement is used, extreme care shall be used in accurately measuring all the parts. The water, sand (and pea gravel, if used), and cement shall be thoroughly mixed for not less than ten minutes to a fluid consistency. This means, wet enough to pour without segregation or bleeding. At the time of placing, grout should have a slump of approximately 5 inches as determined by the Field Slump Test for Grout.

4A-04.5.2 Admixtures: No admixture shall be incorporated into the grout.

4A-04.5.3 Placement: Mortar "fins" protruding more than 3/8 inches from joints shall be removed before pouring grout. The continuous space between the wythe of the facial brick and the back-up concrete masonry units and the hollow and reinforced cells indicated in the drawings shall be filled with grout. The minimum continuous clear dimensions of vertical cores or grout spaces shall be 2 inches, unless otherwise shown on the drawings. Pour heights in excess of 8 feet shall not be permitted where core dimension is less than 4 inches. Provide cleanouts of the bottom masonry course of each core to be reinforced when the pour height is in excess of 4 feet. When cleanouts are required they shall not be closed until after inspection of the core space and the setting of the vertical reinforcement in fixed position. Where pour heights are in excess of 4 feet, grout shall be poured in lifts of 4 feet maximum for the complete length of the continuous wall section under construction, allowing at least 30 minutes for settlement of grout before pouring the next lift. Grout shall be rodded or puddled during placement to insure complete filling of the core. When grouting is stopped for one hour or longer, the grout pour shall be stopped 1-1/2 inches below the top of a masonry unit. Where horizontal beams and reinforced courses are built of open bottom units such as channel blocks, the top of unfilled cores in the course below such horizontal beams shall be covered to confine the grout fill to the beam section. No material shall be used which destroys the bond between courses. Grouting of beams over openings shall be done in a continuous operation. All grout shall be puddled in a place to insure complete filling of cores and incasement of reinforcement. Any grout that is unused after one hour of the initial mixing shall be removed from the work.

4A-04.5.4 Pour Height: Grout pour height shall not exceed 48 times the minimum net core dimension. Pours shall be stopped 1 1/2 inches below the top of a course to form a key at pour joints.

4A-04.5.5 Vibration: Grout shall be rodded or puddled during placement to insure complete filling of the core.

4A-04.6 Reinforcement

FAA-STD-006

9003329 0009145 TOT